U.S.D.A. FOREST SERVICE ENVIRONMENTAL STATEMENT

HERBICIDE CONTROL OF BIG SAGEBRUSH

Prepared in Accordance with
Section 102(2)(C) of P.L. 91-190

Northern Region

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I. DESCRIPTION

This environmental statement describes the Forest Service, Northern Region, planned program for control of big sagebrush (Artemisia tridentata) with the herbicide 2,4-dichlorophenoxyacetic acid (2,4-D) during fiscal years 1972 and 1973. The Region's program for these years is on the Beaverhead National Forest only. The 1972 program has been approved by the USDA Pesticide Coordinating Committee and the Working Group of the Subcommittee on Pesticides. We are including it here for further review of environmental effects.

The sagebrush is sprayed by helicopter with 2 pounds (acid equivalent per acre) of the low volatile isooctyl ester form of 2,4-D mixed with diesel oil as a carrier. The mixture is applied at the rate of 3 gallons per acre.

A. DEFINITIONS USED IN STATEMENT

1. Spray Area. The specific area actually marked out and sprayed to control sagebrush.

2. Project Area. The planned area for sagebrush control within which spray areas are finally laid out. The range allotment or pasture boundary is the outside line of this area.

3. Program Area. A large land area where spray operations are planned. The Beaverhead National Forest is the program area.

B. ECOLOGICAL SYSTEMS

Big sagebrush grows in association with many forbs and grasses over a wide variety of soil types, elevations, and climate conditions in the Region. The largest continuous areas of sagebrush are found in the Beaverhead National Forest in southwestern Montana. In this area, sagebrush has probably always been an important species in these rangeland ecosystems and a climax dominant on a few sites. Historical records and other studies of this area suggest that many of these stands now dominated with 25 or more percent crown cover of sagebrush were originally dominated by grass with only scattered sagebrush(17)(38). Sagebrush has increased on these stands due primarily to too much livestock use of the more palatable forage plants, control of wildfire, and other disturbances. In some areas, the livestock use has caused a decrease in total plant cover which has led to increased soil erosion.

The proposed program will alter, on specifically planned areas, the present sagebrush dominated plant community to a grass dominated plant community. It will alter the animal components of the ecosystem as described further in SECTIONS II, III, and IV of the statement.

Based on past experience, we expect the effects of the program on the grass production will last for 20 years. The effects on most associated animal species are essentially dependent on the rate of forb and brush reestablishment.

Based on the variations in each particular sagebrush-grass ecosystem, exceptions to many of the expected results and effects described in this statement can occur. The planning of areas to be sprayed, the predicted results, and the description of environmental effects of this program are based on 16 years of experience in controlling sagebrush with 2,4-D on the Beaverhead program area, related research, and the advice of Forest Service and outside specialists in range science, wildlife biology, fisheries biology, soil science, hydrology, forestry, economics, and ecology. The environmental effects are also based on the basic premise that planned protection measures will be followed.

C. PURPOSE

The basic purposes in controlling sagebrush are to increase production of forage for use by domestic livestock and to increase grass plant cover to improve the soil and prevent erosion.

D. ORIGIN AND NEED

Sagebrush control projects are originally proposed by the District Ranger when he prepares a range allotment management plan. He has determined that this range improvement method is needed to meet the purposes stated above.

E. OTHER REASONS FOR SAGEBRUSH CONTROL

Basic policy of the U. S. Department of Agriculture calls for all agencies to help in rural area development. The State of Montana looks to Federal Agencies for programs and help to improve the economy of rural rangeland areas. An example of this is the Montana Rangeland Resource Program (27). There is a constant demand by ranchers for increased summer livestock range. County Commissioners ask for programs which will maintain or improve the local economy and the county's income from their share of National Forest receipts. Local chambers of commerce favor actions which are beneficial to the local economy.

F. PLANNED MEASURES TO MINIMIZE ENVIRONMENTAL IMPACTS

1. A minimum amount of herbicide will be used to meet our objective of killing 65 to 95 percent of the sagebrush plants in the spray areas.

2. Three gallons of spray mix will be applied per acre. This mix will contain 2 pounds of 2,4-D acid equivalent (low volatile isooctyl ester) in a diesel oil carrier.

3. Spraying will be done by helicopter at an average height of 15 feet above the sagebrush, so as to insure precise placement of the chemical.

4. Spraying will be done during early morning hours. The wind will be under 6 m.p.h. so as to avoid drift. The temperature will be under 68 degrees fahrenheit to avoid excessive volatilization. Temperature and wind will be monitored during spray operations to prevent drift.

5. Areas of sagebrush to be sprayed have been or will be carefully mapped out using the advice of Forest Service range conservationists, wildlife biologists, soil scientists, landscape architects, and local State Fish and Game Department wildlife biologists before and during projects.

6. Areas agreed upon will be identified on the ground with minimum 300-foot unsprayed strips adjacent to streams in sage grouse range, 100-foot protective strips adjacent to susceptible hardwood or brush, and 50-foot unsprayed strips adjacent to conifer stands. Depending on slope and cold air drainage in the early morning, spraying will be controlled so as to prevent chemical from reaching the unsprayed strips. At times, during the actual spray operation, this will require that the helicopter stay back a distance of 300 feet or more.

7. Flaggers will be used during spray operations to keep the helicopter directly on target between marked spray area boundaries.

8. The mixing of the chemical and carrier will be supervised by an experienced man.

9. The chemical containers will be rendered unusable and disposed of in the Dillon city municipal State approved sanitary landfill.

10. No control work will be done where live sagebrush crown cover is less than 15 percent.

11. Other specific measures to minimize adverse environmental impacts are found through the statement.

G. ECONOMIC AND SOCIAL IMPACTS

There will be four economic and social benefits resulting from this program. The first is a stabilization of present beef production or a contribution toward a long-term increase in beef production in the program area. This will, in turn, contribute toward stabilization of the local economy. The livestock industry is the basis for the economy of the Beaverhead area. This increase in grass production is brought about in a shorter period of time with sagebrush control and intensive management, than with intensive management alone. The second benefit is the local purchase and delivery of diesel fuel. The third is the income provided employees of the projects. The fourth is the benefits derived from direct income increases being spent in the local area for other services and supplies.

There will be no significant change in the amount or type of human recreational use of the project areas. There can be an effect on the quality of an individual's recreation experience based on his own personal preference. Any improvement in water quality coming from treated areas will enhance downstream recreational values.

One adverse economic impact will affect seven grazing permittees who will not graze their cattle on the National Forest for a 1-year period. The permittees have cooperated in this arrangement.

H. ECONOMIC ANALYSIS

This is a benefit-cost analysis bringing all values to present worth (33). The costs and forage increases come from recent similar projects on the Beaverhead Forest. The benefit-cost is calculated two ways; using the 1971 average commercial fair market value in the Western States of $3.97 for one animal unit month of forage (A.U.M.) and using the U. S. Forest Service 1966 base grazing fee of $1.23 per A.U.M. The $3.97 is derived from an index of private land grazing lease rates as determined by the Economic Research Service (2).

1. Project Costs:

Item	Cost per acre
a. Planning (includes cost of field examination by professional specialists)	$ .50
b. Project boundary marking	.20
c. Herbicide	.94
d. Diesel fuel carrier	.59
e. Helicopter rental (fully operated)	1.40
f. Supervision, flaggers, etc.	.78
g. Equipment use (trucks, pickups, pumps, etc.)	.27
h. Worker expenses, per diem, etc.	.16
Total cost	$4.84

2. Project Economic Returns. Analysis of increased grass production on six similar projects involving 10,774 acres on the Beaverhead National Forest shows that annual production of grass increased on the average from 600 to 1,340 pounds dry weight per acre or an average of 740 pounds per acre (52). Research has shown similar results in other areas (1)(33)(43)(65). Fifty percent of this increase will be left for watershed protection and benefits to soil and wildlife. The remaining 50 percent of the increase is available for livestock use. To arrive at dollar values, we have converted this available increased

production to 0.62 A.U.M.'s per acre.* This increase in production is expected to continue for not less than 20 years. This statement that increased forage production will be maintained for not less than 20 years is based on 16 years of sagebrush control experience on the Beaverhead Forest. Continuing measurements of forage production on many areas previously subjected to sagebrush control adequately prove that under management practices used, the increased level of forage production can be sustained for not less than the period stated.

The annual economic return is $2.46 per acre. This is arrived at by multiplying the 0.62 A.U.M. increase by the $3.97 fair market value of one A.U.M. The annual monetary return to the Government is $0.76 per acre. This is arrived at by multiplying the 0.62 A.U.M. increase by the $1.23 Government grazing fee.

a. Current Value of 20-Year Income Stream Based on 5 Percent Safe Interest Rate. The present value of a $1.00 annual income extending over a period of 20 years at a safe interest rate of 5 percent compound interest premise where payments are received at the beginning of the year amounts to $13.08. We can use this figure because grazing fees are collected at the beginning of the year before the grazing season. From this present value of a series of future incomes, we must deduct $1.00 because there will be no income during the first year since the sprayed area will not be used. The remaining value of the expected series of annual incomes is $12.08.

Multiplying the annual economic return of $2.46 per acre times $12.08 (the present worth of expected future incomes) gives an expected economic benefit of $29.72 per acre treated.

Multiplying the expected annual monetary return to the Government of $0.76 times $12.08 (the present worth of expected future incomes) gives an expected monetary benefit of $9.18 per acre treated.

b. Current Value of a 20-Year Income Stream Based on a 7-1/2 Percent Interest Rate that Would be Suitable for a Moderate Risk Investment. The present value of a $1.00 annual income extending over a period of 20 years at a moderate risk interest rate of 7-1/2 percent compound interest premise where payments are received at the beginning of the year amounts to $10.96. We can use the figure for payment at the beginning of the year because grazing fees are collected before the start of the grazing season. From this present value of a series of future annual incomes, we must deduct $1.00 because there will be no income during the first year because the sprayed area will not be used during the year that 2,4-D control of sagebrush is accomplished. The remaining value of the series of annual incomes is $9.96.

Multiplying the annual increased economic return of $2.46 per acre times $9.96 (the present worth of expected future incomes) gives an expected economic benefit of $24.50 per acre treated.

*740 lbs. ÷ 2 = 370 lbs. 370 lbs. ÷ 600 lbs. (cow need per A.U.M.) = .62 A.U.M.'s

Multiplying the expected monetary return to the Government because of increased forage production of $0.76 per acre times $9.96 (the present worth of expected future incomes) gives an expected monetary benefit of $7.57 per acre treated.

c. Other. There are additional benefits in decreased erosion, lessened siltation of reservoirs, and both benefits and costs to wildlife. No attempt has been made to assign dollar values to these side benefits and costs.

3. Benefit-Cost Ratio. The calculated benefit-cost to the national economy over a 20-year period and based on a safe interest rate of 5 percent would be $\frac{\$29.72}{4.84} = 6.14$. That is, for every $1.00 expended, the economy would benefit in the amount of $6.14.

The calculated benefit - cost ratio to the national economy over a 20-year period and based on a moderate risk interest rate of 7½ percent would be $\frac{\$24.50}{4.84} = 5.06$. That is, for every $1.00 expended, the economy would benefit in the amount of $5.06.

The calculated benefit - cost ratio based on direct Government costs compared to monetary returns from grazing receipts over a 20-year period and based on a safe interest rate of 5 percent would be $\frac{\$9.18}{4.84} = 1.90$. That is, for every $1.00 of Government money expended, the Government could expect future income with a present worth of $1.90.

The calculated benefit-cost ratio based on direct Government costs compared to present worth of monetary returns over a 20-year period and based on a moderate risk investment interest rate of 7½ percent would be $\frac{\$7.57}{4.84} = 1.56$. That is, for every $1.00 of Government money expended, the Government could expect future income with a present worth of $1.56.

I. SIZE

The proposed 2-year program involves 8,724 acres to be sprayed, distributed among 12 project spray areas within the Beaverhead National Forest. The projects will involve areas within Beaverhead and Madison Counties, Montana. Further description and individual maps for specific projects are in the appendix. Project locations are also shown on maps at the end of this section.

J. LANDOWNERSHIP AND STATUS

All proposed projects are on federally owned land under National Forest administration except 330 acres of privately owned land. This privately owned land within a National Forest grazing allotment was included at the request of the landowner. All cost of herbicide application on this private land will be borne by the landowner.

K. PHYSIOGRAPHY

The project areas are in mountainous terrain at elevations from 6,000 to 7,500 feet. The topography ranges from nearly level to 50 percent slopes. Most of the spray areas lie on slopes between 10 to 30 percent. Project areas occur on all aspects.

L. CLIMATE

Annual rainfall in the program area is normally between 12 and 30 inches, most of which comes as winter snow. Average annual yield per acre of the Beaverhead River drainage above Barretts measuring station below Grasshopper Creek is approximately 1.99 inches (3). The frost free growing period rarely exceeds 45 days and frosts can occur at any time of the year.

M. SUBSEQUENT MANAGEMENT

Areas treated with herbicide are rested from grazing use during year of herbicide application and during the growing season of the following year. When grazing is resumed, management is under a rest-rotation, rotation, or deferred-rotation grazing system. Fences to implement these grazing systems on these projects are already installed. These systems are designed to maintain the improved range condition achieved through sagebrush control and rest. The Forest Service will inspect these areas to insure that management objectives are carried out.

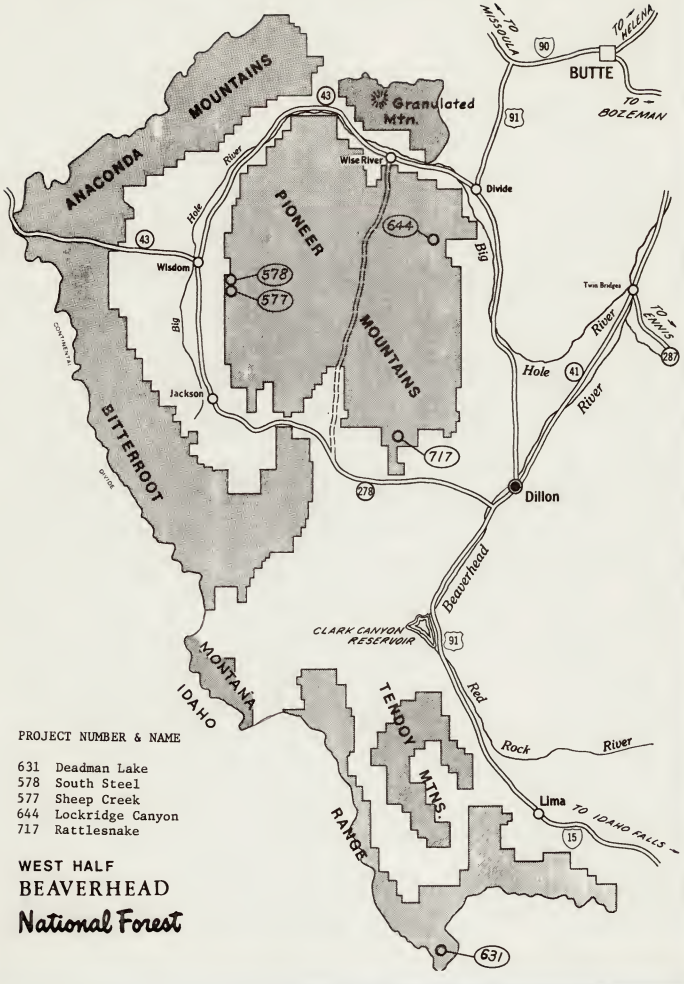
N. HISTORY OF PROGRAM

The Forest Service, Northern Region, initiated big sagebrush control through herbicide use in 1955. Through calendar year 1971, an approximate total of 148,000 acres has been treated. One hundred thirty thousand acres have been treated on the Beaverhead Forest. There are no specific figures on total sagebrush acreage on National Forest lands within the Region.

For comparison purposes, there is a total of approximately 1,130,000 acres of big sagebrush, with 15 percent or more ground coverage (by weight) on all landownerships, including private land, in Beaverhead and Madison Counties, Montana. Some method of control has been effected on 234,000 acres, or 21 percent of the total area of dense sagebrush stands in these counties (4). Fifty-six percent (130,000 acres) of the 234,000 acres has been done on the National Forest.

Initially, the herbicide application was by fixed-wing aircraft. Since 1959, herbicide application has been by helicopter. Use of helicopter is more costly, but it has the advantages of low altitude flying which allows more precise control of the chemical thus reducing environmental impacts, more efficient use of the herbicide, and less hazard to the aircraft and its operator.

Reinvasion of sagebrush on the 130,000 acres sprayed on the Beaverhead is almost nonexistant on some sites. On other sites, the reinvasion, after 13 years, is estimated to range between one-fifth and two-fifths of the crown cover of sagebrush present prior to spraying.



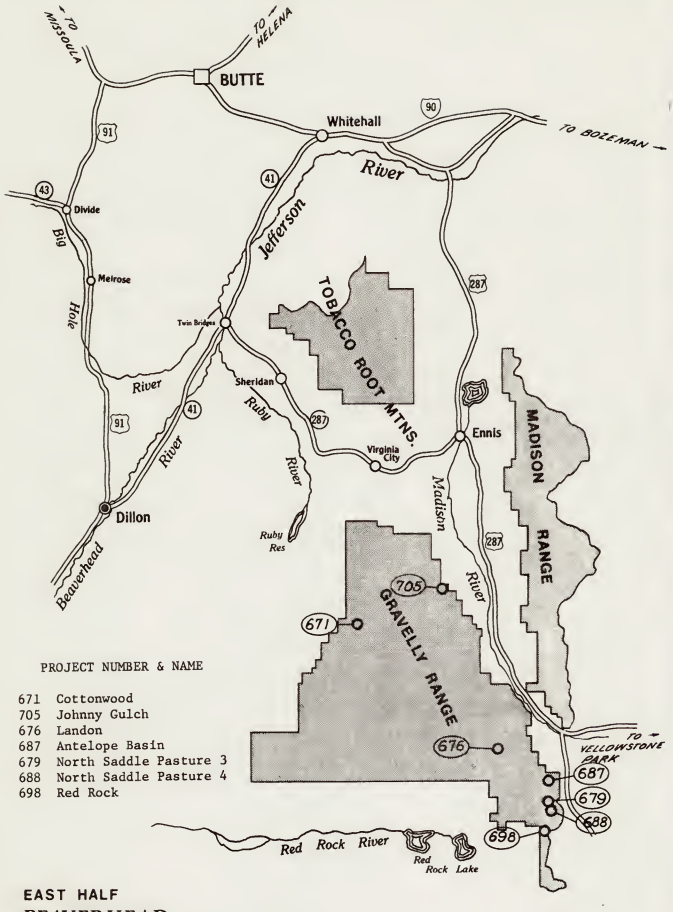
PROJECT NUMBER & NAME

631 Deadman Lake
578 South Steel
577 Sheep Creek
644 Lockridge Canyon
717 Rattlesnake

WEST HALF

BEAVERHEAD

National Forest



PROJECT NUMBER & NAME

671 Cottonwood
705 Johnny Gulch
676 Landon
687 Antelope Basin
679 North Saddle Pasture 3
688 North Saddle Pasture 4
698 Red Rock

EAST HALF
BEAVERHEAD
National Forest

Photograph 1. Actual spray application of 2,4-D to sagebrush by helicopter. Low elevation flying controls drift. Picture also shows typical mountainous sagebrush-grassland and density of sagebrush being controlled.

Photograph 2. Typical project area showing broad expanses of sagebrush at lower elevations becoming smaller and interspersed with timber at higher elevations.

Photograph 3. Typical stand of sagebrush before spraying with 2,4-D. Control action is limited to range sites having dominant sagebrush crown cover, a good understory of grasses, and high productive capability.

Photograph 4. Same area as photograph 3 after control of big sagebrush. Note large increase in grasses.

II. ENVIRONMENTAL IMPACTS

A. AIR

There will be an introduction of 2,4-D and diesel into the air over the spray areas by volatilization and drift. Control measures such as use of low volatile ester and others listed in Section I of this statement are planned to minimize this impact.

B. SOIL

From research results, we can expect approximately 6 parts per million (p.p.m.) of 2,4-D to be deposited in the surface inch of soil in the treated areas (44). This small amount should cause little or no impact on soil micro-organisms (44). Soil micro-organisms are very important in the degradation of 2,4-D (24).

Removing sagebrush cover temporarily allows more exposure of the soil to splash action from any high intensity rainstorms that may occur until vegetative cover is restored.

There will be two temporary physical impacts on the soil. The first is the hand brush clearing of 10- to 50-foot diameter helispots when necessary. The second is the surface disturbance that results from off-road vehicular travel to helispots. Vehicle damage should be limited to crushed grass and slight soil compaction. To minimize this impact, the clearings and vehicle use will be held to the minimum needed.

C. VEGETATION

About 100 to 300 parts per million (p.p.m.) of actual 2,4-D are expected to be deposited on or absorbed by the ground vegetation (44). Decay of 2,4-D reaches 94 percent in 5 weeks (44). Other research has shown that 2,4-D rapidly decays in soils (34)(63). The diesel fuel carrier is also biodegradable and research has shown that it degrades within 6 months (59). There will be a change in the percent of different plant species in the community.

1. Sagebrush. Percent of sagebrush kill based on actual measurements of similar past projects on the Beaverhead Forest, is expected to be from 65 to 95 percent. Research has shown similar results (23)(48). Dead sagebrush will remain present from 6 to 10 years, depending on the moistness of the site. Some re-establishment of sagebrush can occur on some sites. There are no planned measures to minimize these impacts on sagebrush.

2. Grass. There will be an increase in total grass production and vigor in the sprayed areas (1)(22)(23)(33)(43)(65). Expected increases in grass production will range from 490 to 932 pounds (dry weight) per acre (1)(52). There are no planned measures to minimize this impact.

3. Forbs. Many forb plants will be killed by 2,4-D. Some species are not affected. Some after crown death will resprout from the roots the next year. Some species may never return to the ecosystem in the same numbers present during spraying (18)(41). Table 1 (13) shows the presently known effects on various forb species. Effects on two forbs not included in the table, from Beaverhead experience, are: Common dandelion (Taraxacum officinale), light to moderate. Common salsify (Tragopogon dubins), moderate. There are no planned measures to reduce this impact on forbs within the spray areas.

4. Shrubs. The chemical will crown kill some other shrubs and hardwood plants present in the spray area. The chemical drifting may kill some species adjacent to the spray area. Shrubs vary greatly in their sensitivity to 2,4-D. Some will crown kill easily. Some will resprout again from the roots. Table 1 (13) shows the known effects on shrubs. Measures planned to minimize this impact are described in Section I. Additional precautions will be taken to protect the unsprayed strips in all areas where drift is more likely to move. Effects on two shrubs not included in the table from Beaverhead experience are: Rabbitbrush (Chrysothamnus spp.), none to light. Fringed sagebrush (Artemisia frigida), light to moderate.

5. Trees. Lodgepole pine in spray areas may be killed. Growth of Douglas-fir and limber pine can be impeded for 1 or 2 years. The measures previously described to carefully lay out, mark, and control drift to certain areas will minimize this impact. In addition, the helicopter pilot will be instructed not to spray when flying over small patches of trees within spray areas.

6. Aquatic Vegetation. There will be little or no impact on aquatic vegetation when chemical is applied under the control measures stated. If by accident, a large amount of chemical gets directly into live water, aquatic plants may be killed. Measures to keep spray out of live water include buffer zones, flagging, and others previously listed.

D. WATER

Even under the controls of spraying, there may be minute amounts of chemical enter directly into open streams, lakes, or ponds. On brush spraying operations in Oregon, the maximum amount that drifted into open water was .01 p.p.m. (44). In this same project where spraying occurred over open water, the maximum contamination was .1 p.p.m. (44). We expect contamination in this project to be .01 p.p.m. or less due to the avoidance of spraying on any open water. If a very heavy rainfall occurs immediately after spraying, some chemical may be carried into streams. The planned 100-foot unsprayed strip should stop most or all of the surface flow.

TABLE 1. MORTALITY OF PLANTS ON AREAS SPRAYED WITH 2,4-D TO CONTROL BIG SAGEBRUSH[1/]

Species		Mortality[2/]
Shrubs and Trees		
Serviceberry	Amelanchier alnifolia	Heavy
Silver sagebrush	Artemisia cana	Moderate
Threetip sagebrush	Artemisia tripartita	Heavy
Evergreen ceanothus	Ceanothus velutinus	Unharmed[3/]
Lodgepole pine	Pinus contorta	Light[3/]
Quaking aspen	Populus tremuloides	Light[3/]
Shrubby cinquefoil	Potentilla fruticosa	Unharmed
Chokecherry	Prunus virginiana	Light[3/]
Douglas-fir	Pseudotsuga menziesii	Unharmed
Bitterbrush	Purshia tridentata	Light
Willow	Salix spp.	Light[3/]
Whortleleaf snowberry	Symphoricarpos oreophilus	Light[3/]
Spineless horsebrush	Tetradymia canescens inermis	Unharmed
Forbs		
Western yarrow	Achillea millefolium	Unharmed
Nettleleaf giant hyssop	Agastache urticifolia	Light
False dandelion	Agoseris spp.	Moderate
Pussytoes	Antennaria microphylla	Light
Goldenweed	Aplopappus sp.	Unharmed
Orange arnica	Arnica fulgens	Light
Locoweed	Astragalus convallarius	Unharmed

1/Blaisdell, J. P. and Mueggler, W. F., 1956. Effects of 2,4-D on Forbs and Shrubs Associated with Big Sagebrush. Journal of Range Management, 9:38-40.

2/Ratings: Unharmed, light, 1 to 33 percent kill; moderate, 34 to 66 percent kill; heavy, 67 to 100 percent kill.

3/Severe damage to aerial portions, but few plants completely killed--almost all sprouted profusely.

Table 1. (Cont.)

Species		Mortality[2/]
Forbs		
Locoweed	Astragalus miser praeteritus	Unharmed
Locoweed	Astragalus salinus	Unharmed
Locoweed	Astragalus stenophyllus	Heavy
Balsamroot	Balsamorhiza sagittata	Heavy
Sego lily	Calochortus macrocarpus	Unharmed
Indian paintbrush	Castilleja spp.	Heavy
Bastard toadflax	Comandra umbellata	Light
Tapertip hawk's-beard	Crepis acuminata	Unharmed
Larkspur	Delphinium depauperatum	Unharmed
Larkspur	Delphinium glaucescens	Unharmed
Fleabane	Erigeron corymbosus	Light
Wyeth buckwheat	Erigonum heracleoides	Light
Cushion buckwheat	Eriogonum ovalifolium	Unharmed
Sticky geranium	Geranium viscosissimum	Unharmed
Oneflower little sunflower	Helianthella uniflora	Heavy
Flax	Linum lewisii	Unharmed
Western gromwell	Lithospermum ruderal	Moderate
Lupine	Lupinus caudatus	Heavy
Lupine	Lupinus leucophyllus	Moderate
Oblongleaf bluebell	Mertensia oblongifolia	Heavy
Plains pricklypear	Opuntia polyacantha	Unharmed
Beardtongue	Penstemon radicosus	Light
Beardtongue	Penstemon spp.	Heavy
Yampa	Perideridia gairdneri	Unharmed
Phlox	Phlox canescens	Light
Cinquefoil	Potentilla spp.	Heavy
Dock	Rumex sp.	Unharmed
Lambstongue groundsel	Senecio integerrimus	Light
Prairiesmoke	Geum triflorum	Heavy
Goldenrod	Solidago sp.	Unharmed
Violet	Viola spp.	Unharmed
Death camas	Zigadenus paniculatus	Heavy

Footnotes are listed on preceding page.

Project area 717 lies within the city of Dillon's municipal watershed and projects 577 and 578 lie within one of the city of Butte's municipal watersheds. Applied as planned, there will be no known impact on these water supplies. The fact that no spraying will be done over live water, the time it takes for any surface or subsurface flow that may be present to reach the water intake, and the rapid rate of degradation of 2,4-D lead to the conclusion that no harmful amounts of chemical will get into the water supply. Detailed coordination and planning of these projects to assure water supply safety are being done by the Beaverhead Forest with the municipalities involved.

There will be an impact on the amount of water infiltrating spray area soils from snowmelt during a brief period in the spring. There is conflicting research on whether this will be increased or decreased. Some evidence shows that removal of the sagebrush allows more snow to accumulate and more water to enter the soil by a reduction in water loss through evaporation (55)(58). Other evidence shows that infiltration into the soil is restricted by continuous concrete frost formations over open grassland that do not form under sagebrush cover (26)(58). Also in wideswept areas, sagebrush can act as a snowfence to hold more snow thereby increasing the amount of water infiltrating the soil.

There will be an increase in the quantity of water infiltrating the soil during the remainder of the year caused by converting the vegetation from brush to grass.

E. VISUAL APPEARANCES

There will be a change in appearance of the landscape of the treated areas from the visible dominance of live sagebrush to a visible dominance of grass and dead sagebrush. After 6 to 10 years, the dead sagebrush will not be apparent. There are no planned measures to minimize this impact.

There will be a visual impact of diesel storage tanks at the helispots 6 months before and until spraying is complete. These are placed in the fall when the ground is dry. They cannot be moved into the areas in the spring because of wet soils. There are no planned measures to minimize this impact.

F. SOUNDS AND SMELLS

There will be noise caused by the use of a helicopter. There are no planned measures to minimize this impact.

There will be a smell of 2,4-D and diesel fuel during and for a few days after treatment.

There will be a reduction in the smell of sagebrush in the treated areas.

G. HUMAN HEALTH

Project workers will be exposed to the chemical 2,4-D and diesel fuel. Precautions taken to minimize this impact include regular changes of clothing, washing all chemicals off hands before eating, and off the body at the end of each workday. A safety plan will be prepared for the program each year using the National Agricultural Chemical Association's Safety Code for handling pesticides (56).

H. ANIMALS

There will be an impact on livestock grazing capacities of the sprayed areas.

There will be direct and indirect impacts on wildlife in the spray areas. Direct impacts are the toxicity of the chemical, noise, and disturbance. Indirect effects are caused by the changing of wildlife food and cover. Details of effects on wildlife will be covered in SECTIONS III and IV of this statement. Measures listed under SECTION I, DESCRIPTION, and SECTION IV, ITEM H. ANIMALS are planned to minimize the impact on wildlife.

I. CLIMATE

This program will cause no noticeable effect on the general climate of the areas. There will be a change in the microclimate of the specific spray areas. Effects of this change on specific soils, plants, and animals are unknown.

III. FAVORABLE ENVIRONMENTAL EFFECTS

A. AIR

This program will not have any known favorable effects on air quality.

B. SOIL

The long term expected favorable effects to the soil due to converting vegetative cover to grass from sagebrush are:

1. An increase in organic matter content in the surface few inches.

2. Increased earthworm and soil micro-organism activity.

3. Increased porosity due to increased pore space, caused by more roots and root channels and increased earthworm activity.

4. Improved soil structure due to root activity, increased organic matter content, and earthworm activity.

5. Reduced erosion hazard due to vegetative cover preventing crusting and soil detachment caused by direct raindrop impact.

These favorable long term effects on soil are based on the premise that a type conversion from mostly sagebrush with little grass understory to dominant grass cover has been made. They are also based on the premise that sites for control have been carefully selected using the advice of a qualified soil scientist (see SECTION I-B and F) to assure control is applied only on those sites where the soils indicate a past history of grassland cover and a soil morphology that will assure a reasonable chance of a successful type conversion.

Since every site or project is unique, all of the favorable effects must be interpreted in the context of the planned measures to minimize environmental impacts. These long term favorable effects can be reliably predicted (on a sound scientific basis) assuming the sites were carefully selected, a type conversion to grass does occur, and that cattle use is controlled to the extent necessary to maintain a healthy, vigorous stand of grass over a long period of time. The degree of improvement will vary from site to site depending on both its existing condition and the extent to which it represents a "true" grassland site. Past results on the Beaverhead Forest substantiate the fact that these effects do occur where a type conversion has been effective.

Basically, the five effects represent a syndrome of cause and effect relationships associated with a grassland cover type as contrasted to one of shrubby species. Only the surface inch or two is affected at first. Over a period of time, the effects will become significant to a greater depth.

The syndrome basically rests on the difference in rooting systems and surface litter types under grassland versus shrub cover types. Most of the following is ordinary textbook-type information, well established in the scientific literature.

The tremendous volume of grass root systems and the amount of organic matter they add to the soil are well established (32). In the soil-plant systems we are concerned with (grassland versus grassland invaded by sagebrush) additions of organic matter are accomplished by the plant root systems (11)(28)(32). Grass cover favors the accumulation of organic matter and its conversion to humus due to increased surface soil moisture (28)(31)(49), reduced diurnal temperature fluctuations, and increased microbial activity in the rhizosphere (11)(51). As organic matter increases, conditions become more favorable for earthworms and other soil macro-fauna (51)(60).

Increased organic matter, microbial activity, plant roots, and macro-faunal activity promote the development of soil structure (11)(28)(31)(51). Soil structure is essential to rapid water movement and to efficient gas exchange in the soil system. Good structure is an essential part of soil productivity.

Improved soil structure, surface litter, and pore space created by plant root channels and soil macro-fauna, increase infiltration (28)(11)(49)(51), and reduce soil loss by surface runoff (11)(49)(51). Under shrubs, where bare soil is exposed and structure is poor, infiltration is less and runoff greater, even though losses due to raindrop splash may not be significantly greater than under grass (11)(28)(31)(49)(51).

Recent studies in Wyoming (54)(57) and Utah (16) report increased grass cover and soil moisture after spraying. Studies of sprayed areas in Western Colorado report increased grass cover after spraying (61).

Studies in the intermountain area show that increased organic matter reduces soil loss by erosion, except on sandy soils (37). Studies in the intermountain area also show that infiltration rates are affected by aggradation, moisture content, vegetative cover, and litter (36).

C. VEGETATION

There will be a long term favorable effect on the total production of herbaceous vegetation from this program. The removal of sagebrush makes more water, nutrients, and space available for other plants.

D. WATER

Following the spraying of sagebrush, an increase in grass density is expected. The increased density of the grass plants and decomposing

plant parts will help intercept rain droplets--thus reducing the energy of the raindrop necessary to cause splash erosion. The favorable effects on the soil resulting from conversion of vegetative cover to grassland type are described under B. SOIL in this section. These favorable effects help to improve the soil's existing infiltration rate--thus increasing the soil's ability to resist erosion from running water. The effect of the increased grass density to reduce erosion can reduce the amount of sediments entering streams and can thereby improve stream water quality.

There is a possible favorable effect on the quantity of water infiltrating the soil during spring runoff as described in the third paragraph under D. WATER in Section II.

E. VISUAL APPEARANCES

The long term visual change that will occur in the landscape from continuous sagebrush to a mosaic of sagebrush and grasslands is a favorable environmental effect. This opinion is based on principles of perceiving the visual resource found in the Northern Region Forest Landscape Management Handbook, Volume One (5).

F. SOUNDS AND SMELLS

There are no known favorable effects on sounds or smells from this program.

G. HUMAN HEALTH

There are no known favorable effects on human health.

H. ANIMALS

The reduction of sagebrush, the restoration of desirable range forage plants, and the increase in grass, caused by the program, will result in an increase in livestock grazing capacity of the areas. This grazing capacity will be used to stabilize or allow an increase in the numbers of domestic livestock grazing the range.

Controlling sagebrush will increase the degree of interspersion of vegetation types. Thus, a possible long term favorable effect on wildlife may occur by providing more variety of wildlife habitat types and increasing the amount of "edge" effect (14).

Following are known, or possible, favorable effects that may occur on four wildlife species or groups of species:

1. Elk. Elk will benefit with an increased grass food supply on winter range on project Nos. 723, 705, 578, 577, and 676. Elk also benefit from increased grass food supply during the remainder of the year on all projects.

2. and 3. Raptors and Coyotes. A possible favorable effect on raptorial birds and coyotes is a temporary increase in their food supply of rodents due to the removal of rodent protective cover.

4. Rodents. There is an improvement in habitat for meadow voles and other rodents that are primarily grass eaters.

IV. ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

A. AIR

The introduction of small amounts of 2,4-D and diesel into the atmosphere will cause some air pollution. This cannot be avoided because there is no known spray method that will not volatilize some and put some of the spray mixture into fine droplets that will drift into the air. In addition, the chemical can volatilize back into the air from the surface of the plants or soil (25)(44). How serious this amount of 2,4-D and diesel entering in the atmosphere is on other life systems is not known (25). The adverse environmental effects on air will be temporary since the droplets containing the 2,4-D eventually combine with atmospheric particles and are washed out of the atmosphere to earth or water surfaces (25).

B. SOIL

Most of the degradation of 2,4-D occurs after it goes into plants or is deposited on the soil. It is broken down by plant metabolism, soil micro-organisms, hydrolysis, photo decomposition, and chemical decomposition (24)(53). The acetic acid is broken down first, followed by the chlorine, and finally the phenol ring. Each of these is broken into products not harmful to plants or animals. Only through degradation can the environment eventually get rid of the chemical (25)(44).

The possible adverse effect of splash action of raindrops from a high intensity storm after killing the sagebrush could cause soil loss through erosion. The risk of this is low because the spray areas chosen have a good understory of herbaceous vegetation, the sagebrush stalks will remain and the competition release causes grasses to respond quickly. The temporary risk here we consider worth taking to receive the longer term benefits to soil mentioned under B. SOIL in Section III.

The minor damage to the soil caused by clearing small helispots and minimum vehicle use cannot be avoided because access is needed for the projects. The soil will recover from these effects very rapidly.

C. VEGETATION

The most serious adverse effect on the sagebrush-grassland vegetation is that 2,4-D kills many forbs and other shrub plants. This effect cannot be avoided because the species killed are susceptible to 2,4-D and are growing intermixed with sagebrush. It is not practical to control large areas of sagebrush by hand spraying and even with hand spraying, some forbs are killed.

This reduction of numbers of forb and other shrub plants changes the proportion of plant species in the sagebrush-grassland

ecosystem (13)(35)(41). Forbs will begin to return to the plant community over various periods of time. There is a lack of good quantitative data on how long it takes forbs to return to the plant community and in what amounts. One report states that forb populations seem to be regained in 3 to 5 years (22). Preliminary results from another study comparing sprayed and unsprayed areas on the Beaverhead Forest show that in some areas after 11 years the percent of vegetative cover of forbs has not returned to prespray levels and on other sites the total percentage of forbs has returned within 1 year (46). On one site forbs increased (46). Some species may never return at least for the foreseeable future (41). The effect of the reduction of forbs and shrubs on wildlife is discussed in this section under H. ANIMALS.

The killing of lodgepole pine trees and damaging of other conifers will be limited to the specific project areas where scattered trees occur. This will be a very small amount of individual trees that cannot be avoided in spraying operations.

D. WATER

The expected .01 p.p.m. of herbicide that may enter open water will lower water quality some. This small amount of change in water quality has not been found to affect any living organisms using the water. If as much as 1.0 p.p.m. should get into streams because of accident or a heavy unexpected rainfall, aquatic insects and plants may be harmed (24). One study has shown no effect on aquatic algae with full saturation of water (220 p.p.m.) (19). Because of water dilution, it would take amounts much larger than the application rate and 2,4-D would have to be placed directly into the streams to harm fish, larger animals, or man (44).

There is a possible adverse effect on the quantity of water infiltrating the soil from spring snowmelt as described in the third paragraph under D. WATER in Section II. This effect would only cover small acreages and occur under certain climatic conditions conducive to ice formation which changes from year to year. The benefit of increased water infiltration the remainder of the year outweighs this possible adverse effect. There is also evidence that the reverse is true, hence this environmental effect was discussed under both Sections III and IV.

E. VISUAL APPEARANCES

The immediate change in landscape appearance from live to dead sagebrush is adverse when viewed from close range. This effect lasts for a few years until the grasses increase in height and begin to soften the appearance of dead sagebrush (5).

The appearance of large diesel storage tanks in the project areas for 6 months is adverse.

Both adverse effects are temporary and will not be observed by a large number of people because of the remoteness of the project areas from recreational use areas.

F. SOUNDS AND SMELLS

The helicopter noise will affect a few project workers and occasional visitors and disturb native wildlife species present in the area. This temporary noise pollution is unavoidable. Because of the early morning spraying, time of year, and isolated areas being treated, this impact will be minimized.

The odor left by 2,4-D and diesel is gone in a short time. Whether this smell is offensive or not is an individual's subjective opinion. The effect would be on the few project workers, visitors, and wildlife in the area.

The reduction of the smell of sagebrush could be adverse or favorable, depending on personal opinion.

G. HUMAN HEALTH

There is always some hazard to human health in the use of toxic chemicals (39). This hazard is primarily accidental exposure of the skin to large amounts of the 2,4-D when mixing or handling. The chemical can also enter the body through inhalation or directly into an open wound. There will be no exposures heavy enough to cause harm when the chemicals are handled according to project safety plans.

2,4-D is not passed up the food chain like other chemicals (24). It is rapidly excreted by animals (44) and because of its rapid degradation is not considered a serious human health hazard.

H. ANIMALS

Adverse effects will occur on sage grouse, antelope, and deer if sagebrush is removed from critical wintering, strutting, nesting, or other special habitat areas needed by these species. On the specific project areas, all the known critical wildlife habitat areas have been identified and removed from the planned spray areas. This was done on the ground by Forest Service and State wildlife biologists and the District Ranger responsible for the management of the area.

The possible adverse toxic effect of the chemical 2,4-D on any animals and fish, including both terrestrial and aquatic insects, is considered minor. Reasons for this are:

1. The known amounts needed to harm any specie are far in excess of what is applied (44) (45). See Tables 2 and 3.

2. Any chemical ingested by animals or birds is rapidly excreted and does not build up in the food chain (24) (44).

3. The chemical degrades rapidly in the animal (44).

There is a possible teratogenic effect of 2,4-D on animals in the project area. Under Bionetics laboratory tests, mice were injected with 2,4-D together with another chemical or fed 2,4-D in a honey solution. This caused birth defects in the offspring (39). This could happen under natural conditions; however, the doses used in the laboratory tests are far in excess of what animals are subjected to in our spray projects.

Although not detected yet in 2,4-D, it is possible that a teratogenic compound dioxin could be present or formed by burning the 2,4-D or vegetation containing it (20). Research also has shown that 2,4-D degrades in the environment (24)(53). Therefore, this should not be a serious problem because 2,4-D may not form dioxin and fires would have to occur soon after applications. We do not intentionally burn chemically treated areas and wildfire occurrence is low in the vicinity of the projects.

There is a possible toxic effect on grazing animals caused by an increase in nitrates that may occur in some plants after spraying (6)(21)(66). This increase does not always occur and there are natural conditions that cause increases in nitrate (6). The nitrate, when eaten by the animal, changes to nitrites in the intestinal tract. These nitrites can interfere with the transport and use of oxygen causing suffocation. The seriousness and extent of this effect is not fully known. The chances of this occurring with livestock on the project areas are remote because they are kept off of sprayed areas a full year or more. We do not know what effect this increase in nitrate, if it occurs, has on wildlife.

The following are known, or possible, adverse effects that may occur on 11 wildlife species or groups of species as a result of vegetational changes:

1. Brewer Sparrow. This sparrow nests in sagebrush and numbers have declined in sprayed areas (12). We expect a reduction in carrying capacity for these birds in the sprayed areas due to removal of nesting sites. The effect will last in the sprayed areas until sagebrush returns to a density necessary for nesting.

TABLE 2. ACUTE TOXICITY OF HERBICIDES[1]

Organism	2,4-D
Birds:	
LD_{50}, mg/kg	260-2000
No effect, p.p.m.[2]	720[3]
Rodents:	
LD_{50}, mg/kg	375-800
No effect, p.p.m.[2]	1500
Ruminants:	
LD_{50}, mg/kg	400-800
No effect, p.p.m.[2]	2400[3]
Other Mammals:	
LD_{50}, mg/kg	100
No effect, p.p.m.[2]	500
Fish:	
TL_m, p.p.m.[4]	1-60
No effect, p.p.m.[5]	0.1[6]
Other aquatics:	
TL_m, p.p.m.[4]	1-5
No effect, p.p.m.[5]	0.1[6]

[1]Norris, Logan A., 1971. Chemical Brush Control: Assessing the Hazard, J. of For., Vol. 69, No. 10, pp. 715-720.

[2]Concentration in diet for a limited exposure period which causes no acute effect.

[3]Assumes daily food consumption is 10 percent of body weight and that 20 percent of LD_{50} in daily diet has no acute effect.

[4]Forty-eight hour median tolerance limit, i.e., the concentration of herbicide in the water which will kill 50 percent of an exposed population of aquatic organisms in 48 hours.

[5]Concentration in water which has no acute effect following 48 hours' exposure.

[6]Assumes 10 percent of TL_m has no effect.

TABLE 3. CHRONIC TOXICITY OF HERBICIDES[1]

Herbicide and Organism	Dose mg/kg	Equivalent Concentration in Diet[2] p.p.m.	Duration days	Effect
2,4-D				
Mule Deer	240	2400	30	Slight
Cattle	50	500	112	None
Sheep	100	1000	481	None

[1]Norris, Logan A., 1971. Chemical Brush Control: Assessing the Hazard, J. of For., Vol. 69, No. 10, pp. 715-720.

[2]Assumes food intake is 10 percent of body weight per day.

2. Sage Grouse. Sage grouse depend on sagebrush for both food and cover (15)(35)(62). They depend on numerous forbs for summer food (15)(35)(50). Sage grouse summer range occurs in project areas Nos. 577, 578, 631, 671, 687, and 717. There is no known sage grouse winter range or strutting grounds within the spray areas. The removal of sagebrush and forbs in these project areas may cause a population reduction for a period of 2 to 5 years or longer if the forbs do not recover. As forbs and sagebrush begin to return to the sprayed areas, more sage grouse should begin to use the areas again. The total cumulative effect of sagebrush removal has not been known to reduce the sage grouse numbers in the program area.

3. Raptors. The project areas are within the range of several groups of raptorial birds including the golden eagle, red tailed hawk, marsh hawk, and several species of owls. The adverse effect that may occur on raptors is that rodent populations may be lowered due to the removal of forbs. However, the removal of sagebrush cover may make rodents more available to raptors thus increasing their food supply. The effect on the total number of these birds is unknown.

4. Coyotes. Since the coyote subsists mainly on rodents and small animals for food, some adverse effect on their food supply may occur. This effect, we believe, is temporary and not serious because of small sprayed acreages, rapid rodent population recovery, and large range of the coyotes. As with raptors, the removal of sagebrush cover may make rodents more available immediately and actually improve overall habitat temporarily for coyotes.

5. Elk. Elk use all the project areas during the summer months. One adverse effect on elk is the reduction of preferred forbs from their summer range. This cannot be avoided because the forbs are intermingled with the sagebrush. The elk will likely make less use of the sprayed areas until the preferred forbs return. The removal of these areas from elk summer range we do not consider critical, because of the abundance of summer range in the project areas.

Another possible adverse effect on elk is the modifying of sagebrush cover on favored calving grounds. Known calving areas will not be sprayed. Within each project area there will be left unsprayed sagebrush. (See individual project descriptions and maps in appendix.) Much of this is left as buffer zones along timber types. Leave areas should be adequate for elk preferring to calve in sagebrush.

Project areas 705, 578, 577, and 676 contain parts of elk winter range. Sagebrush areas on ridgetops that would be needed by elk

during tough winters have been removed from the spray area. Favorable effect of increased grass on these projects should outweigh the possible adverse effect.

6. Deer. Mule deer winter range is found on projects 577, 578, 644, 671, 717, and 705. Here sagebrush is important to deer for food. These areas have been removed from the proposed spray areas.

An adverse effect that cannot be avoided is the reduction of preferred forbs from deer summer range within the project areas. This effect will last until the preferred forbs return to the plant community. Reduction of forbs from summer range is not considered serious because some forbs are still present in the sprayed areas and the abundance of forbs on adjacent unsprayed areas.

Another adverse effect on deer is the removal of dense sagebrush cover that may serve as fawning or resting areas. We believe that substitute areas can be found on adjacent sagebrush stands.

7. Antelope. During the summer, antelope occasionally use project areas 631, 577, 687, 698, 688, 717, and 679. The unavoidable adverse effect is through the removal of sagebrush and forbs used as food (64). This effect will last until forbs and some sagebrush return, but is not considered serious because of sufficient remaining antelope summer range. The antelope migrate from the areas during the winter.

8. Moose. Moose are found in all of the project areas. Reduced forbs on sprayed areas will cause reduction in summer food for moose (30). This effect is considered temporary and not significant because of sufficient forage on adjacent unsprayed areas and other vegetation types such as aspen that are more favorable to moose (47).

9. Jackrabbits. Jackrabbits utilize sagebrush for food and cover along with other forbs and shrubs in the sagebrush-grass community. Spraying will reduce the carrying capacity of these project areas for jackrabbits. The extent of this reduction is unknown.

10. Rodents. The population of pocket gophers will likely be reduced because of the removal of forbs; their primary food (29). Other rodents will be affected to the extent of the habitat alteration. For example, there may be a change from a favored habitat for deer mice (primarily seed eaters) to an improved habitat for meadow voles (primarily grass eaters). The extent of this change in rodent populations is unknown.

11. Blue Grouse. A probable short-term adverse impact on this species may occur due to a decrease in the forb component of the treated areas. Homogeneous stands of grass are apparently little used as brood cover (42).

V. ALTERNATIVES TO THE PROPOSED ACTION

The following alternative methods of sagebrush control are being considered. Where necessary, comparisons of the environmental effects of the alternatives in chart form follow each brief description.

1. Burning. There are two possible times during the year when this may be done - early spring and late summer. Early spring burning will do less resource damage. Burning is difficult to schedule into an intensive range management plan. Also, suitable conditions for spring burning cover only a few days in this mountainous area and in some years do not occur at all.

ALTERNATIVE 1 - BURNING

	ENVIRONMENTAL EFFECTS		
	Favorable	Adverse	Other Factors
Air	No 2,4-D into air.	Puts smoke pollution into air.	Smoke can be put into upper atmosphere by burning under proper conditions.
Soil	Quickly cycles minerals to soil	Hot burn on fine textured soils will cause an impermeable layer for a short period.	
		Increases soil exposure and erodibility for 1-2 years by removing mulch.	Cooler burn can control some of the amount of mulch burned.
Vegetation	Immediate release of nutrients.	Too hot fire can destroy more important plants.	Fire heat can be controlled some with spring burn.
	Forbs recover faster.	Kills all conifers and top kills other shrubs.	Same effect on long-term pattern of vegetation.
	Promotes sprouting of some shrubs.	Risk of fire escape.	

	ENVIRONMENTAL EFFECTS		
	Favorable	Adverse	Other Factors
Water	No 2,4-D into water.	Possibility of more sediment into stream. Possible ash pollution of water.	
Visual	Removes dead sage plants. No diesel storage tanks.	Looks bad the year burned.	
Sounds & Smells	No noise pollution. No 2,4-D smell.	Smoke smell.	
Human Health & Economics	Less cost to do jobs.	Inhalation of smoke and eye irritation. Larger economic impact on permittees from keeping cattle off longer. Risk of fire escape.	Much more difficult to schedule into intensive range management system. Many areas do not lend themselves to burn safely.
Animals	More variety of forbs recover faster. New growth attracts wildlife. No 2,4-D on animal life. Creates more interspersion of vegetative types than spraying.	Short term destruction of vegetation for wildlife. Spring burn would have less effect. Can catch and burn some small animals and birds.	Wildlife will move out of these areas as they do in spray.
Climate		Short-term effect on microclimates greater than spray.	

Burning is still being considered as a viable alternative where ground conditions will permit it.

2. Mechanical Sagebrush Control. This category includes all known methods developed to dig out or break down sagebrush. These include plowing, railing, chaining, rotary choppers, roto-beating, and rolling choppers. Each method requires one to three heavy tractors to pull the mechanical implements and are limited to slopes under 30 percent and without excessive surface rock.

Two areas in the Upper Ruby River, on the Beaverhead Forest, were rotobeat in 1953 as a trial project for sagebrush removal. One area contained 344 acres and the other contained 80 acres. It was necessary to go over each area twice to get the desired removal of sagebrush. This resulted in considerable soil disturbance. The project resulted in removal of the large sagebrush plants but greatly stimulated the growth of the young plants. The young plants quickly took the place of the plants which were removed. The need for going over each area twice coupled with numerous breakdowns caused by the rockiness of the area resulted in costs which were prohibitive. Within three years after the area was treated the project was deemed a failure. Because of excessive cost and rockiness of these planned project areas we have rejected roto-beating as a viable alternative.

If plowing were chosen, reseeding of grass and forb species would be necessary. This method is usually used only in severely depleted ranges where native plant recovery would be very slow. All of the ranges in planned program area have enough native plants to recover without reseeding.

ALTERNATIVE 2 - MECHANICAL CONTROL

	ENVIRONMENTAL EFFECTS		
	Favorable	Adverse	Other Factors
Air	No 2,4-D into air.	Possible dust pollution into air.	
Soil	Puts more organic material on ground to decay faster.	Light to heavy disturbance of soil mantle.	Must be done on flat slopes with little or no rock.
		May increase soil exposure to erosion.	

	ENVIRONMENTAL EFFECTS		
	Favorable	Adverse	Other Factors
Vegetation	Forbs will return faster under some methods. Trees and some other shrubs can be avoided. Railing & roto-beating destroy less forbs.	Disturbs or destroys herbaceous plants. Faster reinvasion of sagebrush.	No change in fire hazard.
Water	No 2,4-D into water.	More sediment may enter stream from destruction of ground cover.	
Visual Appearance	Removes dead sagebrush appearance. No diesel storage tanks.	Surface destruction. Looks bad for 1 year.	
Sounds & Smells	Noise is not as loud. No. 2,4-D or diesel smell.	Noise lasts for much longer periods of time.	
Human Health & Economics	No chemical health hazard.	Costs are considerably higher to do job.	
Other Animals	No 2,4-D on animal life. Forbs recover faster.	Destroys habitat for 1 year. May kill some small animals and birds.	All other wildlife effects similar to chemical control.
Climate			Probably similar to spraying.

We do not consider mechanical methods a viable alternative for these proposed projects.

3. Use of a Different Herbicide. There are a great number of herbicides that kill sagebrush. It is beyond the scope of this

statement to cover in detail all these chemicals and their possible environmental effects. 2,4-D was chosen because:

a. To our knowledge all of the effects on the environment will be less with 2,4-D than the effects of other herbicides.

b. It is the most selective chemical known from Region 1 experience in sagebrush control (7).

c. It degrades faster than other chemicals suitable for sagebrush (44).

d. It is approved for agricultural and rangeland use by the U. S. Department of Agriculture and is registered for the use we are making of it.

e. It is cheaper than many other chemicals.

f. It mixes or emulsifies well with diesel carrier.

Use of other chemicals under present knowledge is not considered a viable alternative.

4. Use of a Different Formulation of 2,4-D. There are many other possible formulations of 2,4-D. Two that could be used in this program are:

a. 2,4-D amine salts mixed with water.

b. 2,4-D isooctyl ester mixed in an invert emulsion with water.

The amine salt is less effective in killing sagebrush and more pounds of chemical would be placed into the environment.

An invert emulsion applied through a bi-fluid system offers both advantages and disadvantages:

Advantages

1. Less diesel oil is needed as carrier.

2. Sharper control of drift.

3. Almost no volatilization of chemical.

4. More positive placement of spray onto target plants.

5. Improves acceptance by plant so less 2,4-D is needed to get a kill.

6. Less 2,4-D goes into the environment.

Disadvantages

1. The equipment is more complex.

2. Present contracts for helicopter, diesel fuel, and herbicide would need revision and new contractors may have to be sought.

3. Changing the present helicopter contract hours could affect the cost of the entire Region 1 helicopter contract. Region 1 has one contract for all helicopter use.

4. Total cost may be higher.

5. The presence of the emulsifier needed will retard the degradation of 2,4-D in the environment (25).

It appears this method has many advantages for further protection of the environment. We will investigate its use in other areas and definitely consider it as an alternative for the 1973 projects.

5. Biological Control. There are organisms such as Voles (Microtus spp.) that destroy sagebrush by extensive bark stripping (40) and insects (aroga websteri) destroy sagebrush by defoliation (10). These effects have been studied, but to our knowledge, no one has recommended through research, adequate control of sagebrush by biological organisms.

6. Continue Season-long Grazing Management. This alternative is to continue with the season-long grazing system with no sagebrush control.

There would be no immediate change in the environment. However, this would mean managing an entire allotment based on the proper utilization of a few key areas. When the key areas have received the desired utilization, the livestock would be removed from the range. This would result in some major reductions in livestock numbers or drastic reductions in the length of the grazing season. This would have a serious economic impact in the community and less benefits to the nation. A major portion of many of our range allotments would receive very light use or no use. This alternative is not desirable.

7. Intensive Range Management Alone. This alternative consists of changing the range management system of use from season-long grazing to a rest or deferred rotation grazing system capable of improving the vegetation and soil conditions, but without spraying sagebrush. It would take a much longer period of time to improve the vegetation and soil conditions under this alternative. Less livestock products would be produced from the range until improved vegetation conditions were accomplished.

ALTERNATIVE 7 - INTENSIVE RANGE MANAGEMENT ALONE

	ENVIRONMENTAL EFFECTS		
	Favorable	Adverse	Other Factors
Air	No 2,4-D into air.		
Soil	Maintains soil fertility.		
Vegetation	No forb kills. No tree or other shrub damage.	Slow removal of heavy sagebrush cover from the ecosystem. Sagebrush robs more productive forage plants of moisture and nutrients.	No change in fire hazard.
Visual Appearance	No storage tanks.		
Water	No chemical into water.	None	Timing or amount of water release would be same as spraying with management.
Sounds & Smells	No sound pollution. No 2,4-D or diesel smell.		
Human Health & Economics	No health hazard.	Economic impact on permittees and on local economy over a long-term period.	No change in recreational use of land.
Other Animals	Minimum adverse effects on wildlife	Slow development of wider variety of habitat types for animal life.	Wildfires may replace chemical control of sagebrush.
Climate	No effect on microclimates.		

This alternative will be considered viable on a project by project basis.

8. Strip Spraying. This method is used in order to break up large areas of sagebrush. The increased amount of edge effect thus produced will benefit wildlife. We believe spraying irregular shaped areas will benefit wildlife more than spraying parallel strips separated by unsprayed strips. Parallel strips will appear less natural and their appearance will be less pleasing than that of irregular shaped areas.

Irregular shaped spray areas have been planned in the project areas. The amount, shape, and size, of these will continually be evaluated by wildlife biologists from the Forest.Service and Fish & Game Department. Decisions will be made in a project by project basis.

9. Removal of Domestic Livestock. This alternative would have the advantage of preventing all of the adverse effects of chemical control of sagebrush. It would have a severe economic effect on the grazing permittees depending on these areas for summer grazing. It may put them out of business. It would take decades for the areas to reach climax vegetation where there would be less sagebrush and would keep the project area's productivity very low. Since there are other more viable alternatives, this one should only be considered as a last resort.

VI. RELATIONSHIP BETWEEN SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE OF LONG-TERM PRODUCTIVITY

The long-term products from the treated areas and the effect this program will have on them are:

1. Clean Air. There will be no change in the present production of clean air from the treated areas.

2. Stable Soils. There will be a gradual improvement in the long-term production of stable soils on the treated areas.

3. Food for Domestic Livestock. There will be an increase in the long-term production of food for domestic livestock on the treated areas.

4. Food and Cover for Wildlife. There will be an increase in the long-term production of food and cover for some wildlife species and a decrease for others in the treated areas.

5. Clean Water. There will be a long-term improvement on the quality of water coming from the areas.

6. Natural Beauty. The long-term effect on natural beauty depends on each viewer's personal opinion.

7. Environmental Education. The treated areas will demonstrate to all who are interested (land managers, land owners, wildlife biologists, individuals, groups, etc.) the effects of these control programs.

VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

This program will cause no known irreversible or irretrievable commitment of resources.

VIII. CONSULTATION WITH OTHERS

A. ANALYSIS OF COMMENTS RECEIVED ON THE DRAFT STATEMENT

GENERAL

Comments received from a good cross section of agencies, groups, and individuals ranged from highly favorable to highly unfavorable. Many of the unfavorable comments brought out environmental effects that could happen if control areas were not properly selected or protection measures were not followed. Improvement was made of the list of protection measures in the description section and the other protection measures and criteria of site selection are found in other parts of the statement. Many of the specific comments were important and we have used them in the final statement.

All of the predicted environmental impacts and effects described in the draft and final statements are based on this basic premise: --- The protection measures listed in this statement will be followed to the best of our ability. ---

Since the draft statement was based primarily on that premise, our analysis of the comments is also based primarily on it. That is, we rejected the comments that were based on a different premise (i.e., that we would not follow the protection measures). However, we did carefully consider comments suggesting changes in the protection measures or that brought out adverse effects that could happen if the protection measures were in error. We also rejected those comments that were simply describing practices of the past, were too general, were based on our general range management practices instead of on sagebrush control on these specific projects, or were based on environmental conditions different than found on these projects.

VIEW OF OTHERS

1. Lee E. Eddleman, Assistant Professor, Range Management, University of Montana, Missoula - Comments were largely favorable. Much concern was expressed that control be only carried out on the more productive areas. We agree and this is covered in the text. We are opposed to 100 percent kill of sagebrush and this is in the text.

We agree that it is difficult to classify, without question, sites that were either originally sagebrush dominated or originally grass dominated. A reduction of certain forbs on the areas sprayed, for a period of time, is recognized as having adverse effects as noted in the text. We agree and the text includes Forest Service commitment to adequate long-term grazing management control to protect the resource. Suggestions concerning contradictions, status of sagebrush reinvasion, and other items to improve the understanding have been included in the text. The text now includes information to show that fences are already in. We agree that fences are necessary

for management control. The suggestion that "purpose number 3 may be the most important" was carefully considered, but rejected in favor of Number 1 and Number 2 which were retained in the text. We judge these to more correctly state the purpose of sagebrush control.

2. Kit C. Walther, Project Officer, Environmental Sciences Division, State of Montana - Department of Health and Environmental Sciences - Three questions were raised. The summarized questions and our comments follow:

a. The Board of Health questioned whether the landfill dump where empty pesticide containers will be disposed of has been checked for suitable soil and hydrology characteristics. They said we should insure that pesticide containers will be buried immediately after deposition and asked us to confer with them and the Department of Agriculture on container disposal.

We will have our soil scientist and our hydrologist both check the landfill for suitable characteristics before use. We will arrange for the landfill operator to bury the empty containers immediately after placement. We discussed herbicide container disposal with Mr. Walther by telephone. He was pleased with our plans to check out the landfill and gave us more valuable information on the decontamination of the herbicide containers.

b. The Board said we should consult them on measures to protect human health, specifically the health of project workers.

Worker health will be protected by accomplishing the job in accordance with the written Project Safety Plan. The text has been revised to expand on this. In a phone discussion with Mr. Walther, we also picked up another reference on human safety which we can use to guide us in preparing the project safety plans.

c. The Board said that measures to control livestock use after the 1 year of nonuse are necessary to prevent encroachment of sagebrush and subsequent soil disturbance.

This is correct. Intensity of grazing use will be controlled to maintain satisfactory range and soil condition. This subject is covered in the statement. More detailed written measures covering the livestock management are found in the written Allotment Management Plan on the District.

3. Raymond T. Moore, National Institute for Occupational Safety and Health, U. S. Department of Health, Education, and Welfare - Mr. Moore returned the statement without comment as the duties of the Environmental Control Administration were transferred to the Environmental Protection Agency.

4. Walter F. Mueggler, Principal Plant Ecologist, Intermountain Forest and Range Experiment Station, USDA, Forest Service, Forestry Sciences Laboratory, Montana State University, Bozeman - Mr. Mueggler raised some concerns which we feel are now covered in the final statement. Some of his comments were editorial and they also included many good suggestions. These have been included in the text.

Issue was raised in regard to the method of computation of benefit-cost ratio. His suggestion of comparing the benefits with the costs 20 years in the future would have similar results as our analysis, which, simply brings future values to present worth. The economic analysis has also been expanded in the text.

Issue was raised to more clearly define criteria used for selecting areas to be sprayed. The text has been expanded in many places and includes more of these criteria that apply to these specific projects for the next 2 years. General guidelines for selecting plant control areas can be found in Region 1's Range Improvement Standards Handbook (7) and Region 1's Wildlife Surveys Handbook (8).

We agree that our third purpose was questionable and have dropped it.

We reviewed Daubenmire's opinions on sagebrush control and have answered these concerns in the text or further on in this Section.

The Section on the benefits to soil have been expanded in the text to show further substantiation.

5. Peter V. Jackson, Chief, Grass Conservation Bureau, Conservation Districts Division, Montana Department of Natural Resources and Conservation, Helena - Comments were highly favorable. Excellent suggestions were made and have proven helpful in revision of the text.

6. Carl L. Wambolt, Ph.D., Range Specialist, Cooperative Extension Service, Montana State University, Bozeman - Comments were largely unfavorable. One of his basic concerns is the possible soil loss and the effects of spraying sagebrush on the soils. We have expanded this portion of the statement to clarify this point.

Another major concern is the effects of sagebrush control on wildlife. This concern is equally shared by us and the Montana State Fish and Game Department. For this reason, every proposed project is coordinated with the local Fish and Game biologists before any control measures are done. The expanded text answers these wildlife concerns.

The rest of his concerns, we believe, are adequately answered in the text.

7. D. Roscoe Nickerson, Secretary, Skyline Sportsmen's Association, Inc., Butte, Montana - They know the intent of the program, but they are concerned with sage grouse breeding and strutting grounds, fish

kill from 2,4-D, nitrate injury to wildlife, and the permanency of program effects on the vegetation.

All known sage grouse strutting and nesting in Steel Creek and the other projects have been protected by mapping out, on the advice of Forest Service range conservationists, wildlife biologists, and State Fish and Game Department wildlife biologists.

The Association assumes that runoff containing 2,4-D kills fish. Based on present knowledge, the amounts expected to get into streams (if any) are far below the amounts harmful to any specie of fish.

There is a possible toxic effect on grazing wildlife species by nitrate increase in some plants. This increase does not always occur. The seriousness and extent of this is not known.

The permanency of the program effects on the vegetation is maintained by well-managed range. However, weather factors, density of sagebrush, plant succession, and other variables do affect the period of effectiveness. Sagebrush kill is expected to be from 65 to 95 percent. Thus, a source of reinvasion is possible under the best management practices.

The effect on Chrysothamnus is now covered in the text.

8. Melvin S. Morris, Professor of Forestry, Range Management, University of Montana, Missoula - Comments were favorable with suggestions as to how the report might be improved. The portion of the report on project descriptions was reanalyzed. Maps of projects are now included with the text to show the size, shape, and edge effect of actual patterns of sagebrush to be sprayed. We are also opposed to anything resembling large square blocks. The shallow clay soils in the vicinity of projects 631 Deadman Lake and 671 Cottonwood are not to be sprayed. The suggestion to emphasize adequate inspection to assure good range management following spraying has been expanded in the text. We agree that more biological studies are desirable. Efforts will be made to secure the funding to initiate additional studies.

9. Directors, Southwestern Montana Stockmen's Association, Dillon, Montana - They are in favor of the continued use of herbicides for sagebrush control. They see many benefits to the program.

10. Daniel G. Block, Associate Professor of Biology, Western Montana College, Dillon, Montana - His overall reaction is favorable to the proposed program provided the protection measures are followed. His main concern involved the identification and protection of vital wildlife habitat areas. His suggested strengthening of protection measures and other suggestions have been included in the text.

11. James E. Short, Member of the Dillon Rotary Club, Dillon, Montana - His comments were not adverse to the projects. He expressed

concern for excluding antelope, deer, and sage grouse from the wildlife species that would be effected favorably. He may have failed to note that these species were covered under the animals affected unfavorably.

He expressed a need to provide emergency areas for game where sagebrush protrudes above the snow. This comment is covered in the text.

12. Earl J. Mooney, Chairman, Beaverhead County Commissioners, Dillon, Montana - Mr. Mooney's comments were all favorable.

13. Daniel Vichorek, Helena, Montana - His comments did not appear to be adverse to spraying, but he felt the text had some shortcomings. He noticed that sage grouse and antelope, to a lesser degree, did not relocate successfully in adjacent areas after reduction of habitat. This concern is covered in the text.

He thinks studies should be done to determine the relative effectiveness of sage spraying in various types of soils. This remark has been covered in the statement. The forb table now includes common names.

14. Rick Foote and Members, Butte Free University, Butte, Montana - Comments were beneficial and expressed earnest concern for the total effects of the herbicide that is introduced into the environment. Their recommendation for close supervision on the projects to insure that no chemical is sprayed into water will be followed. Their concern for protection of sage grouse populations, strutting grounds, and nesting areas is equally shared by us and the Montana Fish and Game Department biologists. The identification of these areas is being coordinated with the Fish and Game biologist and removed from proposed spray projects.

The need for more studies connected with the chemical control of sagebrush has been referred to our research branch.

We also consider alternative to chemical control on every project and will continue to seek better methods.

15. L. E. Warren, Ag-Organics Department - Research and Development, The Dow Chemical Company, Davis, California - Comments were all favorable.

16. A. B. Linford, State Conservationist, USDA, Soil Conservation Service, Bozeman, Montana - Comments were favorable.

17. Meyer Chessin, Professor, Department of Botany, University of Montana, Missoula - The expected life of the projects was questioned referring to a study conducted in Wyoming where, 14 years after spraying on grazed range, more sagebrush was present on the sprayed range than on unsprayed. We reject this comment since the Johnson study was conducted on a sheep driveway in a semi-desert area which received

7 to 9 inches annual precipitation; therefore, the conditions do not represent the conditions on the areas we are treating.

He referred us to opinions on sagebrush control stated by R. F. Daubenmire. These points are covered in another part of this section or the text has been revised to include them.

Mr. Chessin expressed concern about the use of the isooctyl formulation of 2,4-D as a Bionetics laboratory study indicated it caused birth defects in offspring of female mice when fed orally or injected through the skin in a solvent. We overlooked this study when the statement was prepared, so the text has been revised to include this possibility. He also pointed out the possibility of the formation of dioxin, a contaminant found in 2,4,5-T (a chemical related to 2,4-D). This has also been included in the text.

It may be possible that the breakdown of 2,4-D will be slower under conditions on the Beaverhead. Some of the research we used was done in Western Oregon where it is more moist. Actual breakdown time will depend on the specific conditions on the ground. We do not know exactly how long it will take.

We acknowledge that the rate of 2,4-D breakdown can be slower than its naturally occurring auxin counterpart. However, it is broken down by plants and other methods as explained in the text.

The weakness of our biological control portion was pointed out. We have expanded this portion to include this comment.

Concern was expressed for a need for nonchemical method of sagebrush control. We have expanded this portion of the statement to clarify this point.

18. Richard L. Timken, Ph.D., Assistant Professor of Biology, Western Montana College, Dillon, Montana - Comments were not adverse to the projects. He was concerned with the program on the basis of added income to employees and to local economy. These are not justifications of the projects, but merely a listing of the benefits that will occur. The income to the local economy is an important benefit and is retained in the text.

He questions the wildlife habitat knowledge of Forest Service employees. The statement has been modified to stress the services of the State wildlife biologists.

19. Geoffrey E. Greene, President, Society for Range Management, International Mountain Section, Great Falls, Montana - Comments were largely beneficial. The suggestion to expand the History of the Program section to include information regarding to what extent sagebrush has reinvaded the sprayed areas has been incorporated into

the statement. The suggestion to expand the Biological Control section to include information regarding the insect defoliator (Aroga websteri) has also been incorporated in the statement.

20. Everett A. Keyes, Vice President, and Perry H. Nelson, Chairman, Natural Resources Committee, Gallatin Sportsmen's Association, Bozeman, Montana - They recommend that our plans for sagebrush control with herbicide be discarded. They further recommend the immediate implementation of intensive range management.

The practice of proper range management is implicit in the Forest Service mandate to manage public lands for the public good. Control of sagebrush with herbicide is a tool that is presently used to accomplish range improvement. Without plant control, management objectives will not be attained on the area within a reasonable time.

The concern that the Region's program is limited to the Beaverhead National Forest has been covered in the text.

We accept the suggestion by Economist Gene Quenemoen to incorporate different interest rates. These rates are included in the text.

Their concerns on the effects on wildlife and the ecology of sagebrush, we believe, are covered in other parts of this section and in the text revisions.

21. Donald L. Brown, Director, State of Montana, Department of Fish and Game, Helena, Montana - The response of this agency was strongly unfavorable to the proposed spray program. Generally, this response was based on what the agency considered was an inadequate treatment of the impacts of a sagebrush control program on wildlife and a bias toward livestock grazing. The comments primarily are of a general nature rather than directed at specific spray areas. The Department acknowledged its role as the primary opponent of herbicide control of sagebrush.

The comments are summarized into broad categories below where specific comments are analyzed.

Soils and Watershed. The discussion on SOIL (SECTION III-B) has been expanded. This discussion, coupled with the revisions in the DESCRIPTION SECTION I, offers a more definitive explanation of anticipated impacts on the soil resource. The crux of these discussions is that only higher productive sites with the best potential for a conversion to a grassland aspect are to be sprayed. Under these conditions, the five long-term favorable effects outlined in SECTION III-B can be expected to occur.

The Department specifically objected to the expressed purposes for controlling sagebrush, of restoration of plant cover and erosion

prevention, and of restoration of the former balance of plant species. The revised sections on soil clarify the purpose of restoration of plant cover and erosion prevention. Restoration of the former balance of plant species, while possibly a long-term favorable effect, is not a purpose for initiating the projects and has been deleted from this section (I-C).

Ecology of the Sagebrush Type. Objections raised by the Department in this category center on the references of successional status of the sagebrush communities, the relative value of associated species, and the status of interspersion of vegetative types.

After further review of the references, we feel only Morris and Pace, 1958, and Cotter, 1963,(new citation), offer applicable data. The agency did not disagree with the concept that sagebrush was subordinate to grasses at some sites in Western Montana.

The confusion in the text which relates to effects of the program on animals in SECTION I-B, ECOLOGICAL SYSTEMS, as noted by the Department, is apparent. We modified our statement to include the concept that animal population levels are directly dependent on changes in the habitat.

The Department objected to the statement in SECTION III-C which states the removal of sagebrush makes water, nutrients, and space more available for other plants. They cite Daubenmire, 1970, working in the State of Washington, as evidence which would discredit this statement. We reject this criticism on the following basis.

First, the Washington study occurred on sites which were generally drier than those on the Beaverhead. Herbaceous vegetation begins aestivation in June in Washington according to Daubenmire. The peak of growth occurs in June with aestivation not occurring until approximately August on the Beaverhead sites. Thus, the sites are obviously dissimilar. Also, since moisture is not used by removed sagebrush, roots of herbaceous vegetation actually penetrate deeper into the soil. Sagebrush has both shallow and deep roots. The shallow roots compete with herbaceous vegetation. These factors, coupled with the elimination of competition with shallower sagebrush roots, support our original statement.

On the question of type interspersion, the Department disagrees that there is necessarily a long-term favorable effect on wildlife. This effect is, of course, contingent upon increased use by some species of wildlife. Therefore, we have modified our statement to recognize the potential long-term favorable effect.

Wildlife and Its Habitat. The primary criticism made by the Department in this category is that evaluation of impacts on wildlife or wildlife habitat is inadequate. Because the intent of Table 2 was not recognized

by any of the reviewers and has only caused confusion, we have deleted it from the text. Since the specifics vary for each comment, they are treated separately below:

We acknowledge the criticism that "critical wildlife habitat" does not include all wildlife habitat (SECTION IV-H). As noted in the text, however, this information is the most complete that is available for the various spray areas, with both Forest Service and Department information used. As in all things, the data must be updated continually.

The apparent confusion between 1966 and 1972 protective measures referenced on page 3 of the Department letter has been clarified in SECTION I-F. Our guidelines (not standards) on the width of protective strips have not changed. However, the strip-spray pattern has never been a part of our guidelines. Protective strips have been evaluated (and in most cases agreed upon) on the ground by both Beaverhead and Department biologists at all but two projects. The latter are still under evaluation with Department biologists.

We accept the criticism relative to the effect of sagebrush control on Brewer's sparrows living in adjacent unsprayed areas and have deleted the statement (SECTION IV-H1).

We have included the sage grouse summer range data offered by the Department. We also acept the statement that projection of sage grouse movements is conjectural since no data is available regarding habitat potentials of adjacent areas. We have modified our statement accordingly (SECTION IV-H2).

A general criticism by the Department on SECTION IV-H (ANIMALS) is that the proposal results only in animal displacement. This implication is not our intention. We recognize if adjacent habitat is "full" (for whatever reason, food, cover, social needs) the removal of a particular species habitat will result in a loss in the overall population until the spray areas again become suitable habitat. We would readily accept any specific data which would aid our consideration of animal behavior.

We accept the information on blue grouse and have deleted the statement under favorable effects and included one in the adverse effects (SECTION IV).

Alternative Proposals. In general, the Department favors burning and intensive range management as alternatives to herbicide control (SECTION V). Burning, as they point out, has not been extensively used in the Beaverhead area. As a result, technology is currently incomplete.

We are engaged in some experimental efforts in this area and anticipate burning may become an operational management tool in the future.

Basically, intensive management alone was rejected as the course of action in the proposed areas because of the time element. While intensive management alone may give us the same results on a long-term basis, sagebrush control gives us accelerated livestock forage production in the intervening period.

We accept the criticism that strip spraying was not considered as an alternative. We have included this alternative, including analysis in SECTION V.

Economics - Cost Benefit Ratio. The 20-year project life and our use of Krenz as a reference was the main objection. The Department also feels that we cannot use Big Horn precipitation data in our area. These references have been deleted. Forest experience has been used to calculate cost-benefit ratios as incorporated in the text.

22. Lloyd F. Meyer, A-95/EIS Coordinator, State Department of Economic Development and Planning, Helena, Montana - This agency questioned how severely the economy would suffer if the project were not accomplished, whether the County Commissioners and local Chamber of Commerce actually supported the project, whether USDA policy to improve the economy of rural communities is a worthwhile objective, whether one Ranger's judgment should be sufficient to initiate planning for a sagebrush control project, whether the report is clear enough to generate support for the project, and suggests that a public meeting might be desirable to obtain broad public expression of opinion and to generate support for defensible projects.

These concerns are all considered in the environmental statement. However, we will comment on the questions raised.

If the projects are not accomplished, the potential benefits to the local economy would not be realized. In some cases, grazing use would have to be further restricted to protect vegetation, soil, and water. Failure to accomplish the work would not seriously damage the economy, but would forego the opportunity to improve it. The County Commissioners and local Chamber of Commerce have supported range improvement through sagebrush control for several years. The County Commissioners again affirmed their support upon reviewing this environmental statement (see letter enclosed). The goal of improving the economy of rural communities is policy not only of the Administration but also of the Congress. This goal becomes significant when one considers that average family incomes in the two counties affected are significantly below the national average (9).

The Forest Ranger does not make a unilateral decision on control of sagebrush on a particular area. The Ranger identifies areas that may qualify for range improvement practices to improve forage production and benefit soil and water quality. Any project proposal is based

on intensive field study by a qualified multidiscipline team (SECTION I, B and F). Final project approval is by the Forest Supervisor.

Public meetings have been held and are continually being held to give the public opportunity to comment on all phases of Beaverhead National Forest management including sagebrush control projects. This environmental statement has been very widely distributed with a request for comments. The statement was not prepared to gather support for the projects, but to display their possible environmental effects. We do not believe another public meeting is necessary now.

B. Federal, State, and Local Agencies, and Individuals to Whom the Final Statement will be sent

1. Federal Agencies

John Green, Regional Administrator
Region 8 Environmental Protection Agency
Room 916, Lincoln Tower
1860 Lincoln Street
Denver, Colorado 80203

Jack O. Horton, Deputy Assistant Secretary for Programs
U. S. Department of Interior
Washington, D. C. 20240

(18 copies - This is to cover Bureau of Sport Fisheries and Wildlife, Bureau of Land Management, National Park Service, Bureau of Reclamation)

A. B. Linford, State Conservationist
Soil Conservation Service
P. O. Box 970
Bozeman, Montana 59715

2. State Agencies

Gary Wicks, Director
Department of Natural Resources and Conservation
Helena, Montana 59601

Donald L. Brown, Director
Montana Fish and Game Department
Helena, Montana 59601

John S. Anderson, Director
Attention: Kit C. Walther
State Department of Health and Environmental Sciences
Helena, Montana 59601

Perry F. Roys, Director
Attention: Lloyd F. Meyer
Department of Planning and Economic Development
Capitol Station
Helena, Montana 59601

Willis B. Jones, Chairman
Montana Fish and Game Commission
Suite 410, Petroleum Building
Helena, Montana 59601

3. Elected Officials

Honorable Mike Mansfield
United States Senate
Washington, D. C. 20510

Honorable Lee Metcalf
United States Senate
Washington, D. C. 20510

Honorable Richard G. Shoup
House of Representatives
Washington, D. C. 20515

Honorable John Melcher
House of Representatives
Washington, D. C. 20515

Douglas Smith, Agriculture Coordinator
Governor's Office
Capitol Building
Helena, Montana 59601

4. County - Local Government and Agencies

Board of County Commissioners
Beaverhead County
Dillon, Montana 59725

Board of County Commissioners
Madison County
Virginia City, Montana 59755

5. Organizations, Groups, Universities, and Individuals

D. Roscoe Nickerson, Secretary
Skyline Sportsmen's Association, Inc.
Box 173
Butte, Montana 59701

Gallatin Sportsmen's Association
Attention: Everett A. Keyes and Perry H. Nelson
703 West Mendenhall
Bozeman, Montana 59715

Carl L. Wambolt, Ph.D.
Range Specialist
Cooperative Extension Service
Montana State University
Bozeman, Montana 59715

Dr. Gene Payne, Professor
Animal and Range Science Department
Montana State University
Bozeman, Montana 59715

Walter F. Mueggler, Principal Plant Ecologist
Forestry Sciences Laboratory
Montana State University
Bozeman, Montana 59715

Daniel G. Block, Associate Professor of Biology
Western Montana College
Dillon, Montana 59725

Melvin S. Morris, Professor of Forestry
Range Management
University of Montana
Missoula, Montana 59801

Peter V. Jackson, Chief
Grass Conservation Bureau
Conservation Districts Division
Montana Department of Natural Resources and Conservation
Helena, Montana 59601

Geoffrey E. Greene, President
International Mountain Section
Society for Range Management
Great Falls, Montana 59401

Lee Eddleman, Assistant Professor
Range Management
School of Forestry
University of Montana
Missoula, Montana 59801

Meyer Chessin, Professor
Department of Botany
University of Montana
Missoula, Montana 59801

Butte Free University
c/o 411-1/2 W. Mercury
Butte, Montana 59701

Directors
Southwestern Montana Stockmen's Association
Box 190
Dillon, Montana 59725

President
Dillon Rotary Club
Dillon, Montana 59725

Dr. James Short, President
Western Montana College
Dillon, Montana 59725

Richard L. Timken, Ph.D.
Assistant Professor of Biology
Western Montana College
Dillon, Montana 59725

L. E. Warren
Ag-Organics Department - Research and Development
The Dow Chemical Company
Route 1, Box 1313
Davis, California 95616

Mons Teigen, Secretary
Montana Stockgrowers Association
P. O. Box 1679
Helena, Montana 59601

Daniel Vichorek
503 Hillsdale
Helena, Montana 59601

APPENDIX I. INDIVIDUAL PROJECT DESCRIPTIONS AND MAPS

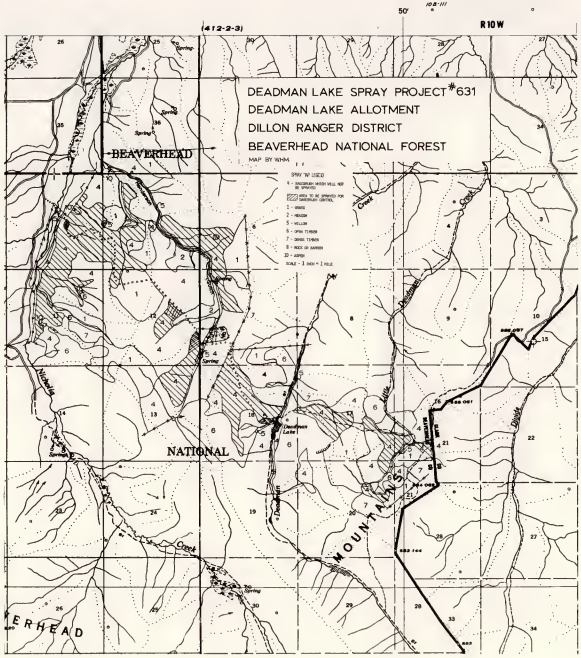
APPENDIX I. INDIVIDUAL PROJECT DESCRIPTIONS

631 Deadman Lake

This project includes portions of Deadman Creek, Henderson Gulch, and Nicholia Creek which are tributaries of Big Sheep Creek along the northeast slope of the Beaverhead Mountains. The project area contains 3,275 acres of sagebrush range with a perennial grass understory. In the spring of 1972, we plan to spray 945 acres of the dense sagebrush on the most productive sites. We will leave 2,330 acres of low density sagebrush and sagebrush areas that are important summer habitat for sage grouse. The project area is largely open grassland with occasional small stands of Douglas-fir. The project is generally on a northwest exposure with slopes ranging from 0 to 40 percent and averaging about 10 to 15 percent.

577 Sheep Creek and 578 South Steel

These two projects join each other and are located on portions of Steel Creek, Francis Creek, Sand Creek, and Sheep Creek drainages on the west slope of the Pioneer Mountains. The project areas contain 1,446 acres of sagebrush range with a perennial grass understory. In the spring of 1972, we plan to spray 1,200 acres of sagebrush of which 334 acres are being controlled on private land under cooperative agreement. There will be 246 acres of sagebrush left as unsprayed zones to protect streams and other vegetative types. Douglas-fir stands border the projects on the east side and open sagebrush and grasslands border on the west. These projects are

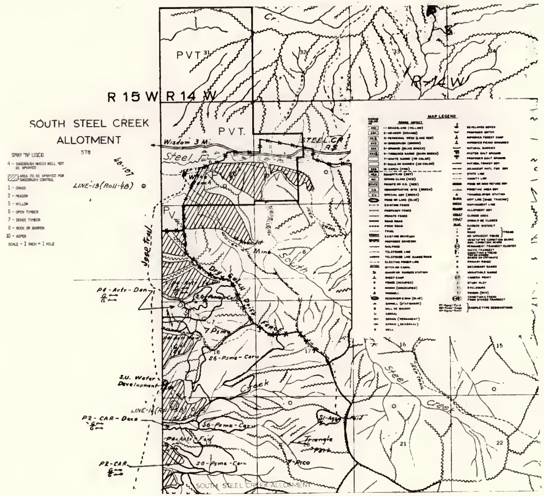

DEADMAN LAKE SPRAY PROJECT #631
DEADMAN LAKE ALLOTMENT
DILLON RANGER DISTRICT
BEAVERHEAD NATIONAL FOREST
MAP BY WHM
BEAVERHEAD
NATIONAL
MOUNTAINS
R 10 W
(412-2-3)

SHEEP CREEK ALLOTMENT
WISDOM RANGER DISTRICT
BEAVERHEAD NATIONAL FOR.

Field Work By: R.J. McElfresh - A.C. Dickens - J.C. Burton

Date: 1950 & 1952

Revised: 1964 by R.J. McElfresh - Dennis C. Hithaus



R 15 W
R 14 W
SOUTH STEEL CREEK
ALLOTMENT
578
SPRAY MAP LEGEND
4 - SAGEBRUSH WHICH WILL NOT BE SPRAYED
AREA TO BE SPRAYED FOR SAGEBRUSH CONTROL
1 - GRASS
2 - MEADOW
5 - WILLOW
6 - OPEN TIMBER
7 - DENSE TIMBER
8 - ROCK OR BARREN
10 - ASPEN
SCALE - 1 INCH = 1 MILE
48-197
LINE-13 (Roll-48)
PVT
PVT.
Wisdom 3 Mi.
Steel
STEEL CR R.S.
Jeep Trail
Dry Gulch Drift Fence
South
Creek
Steel
Creek
S.U. Water Development
P2-CAR-Deca
P2-CAR
S6-Psme-Caru
Triangle Park
MAP LEGEND
SOUTH STEEL CREEK ALLOTMENT

on a west exposure with slopes ranging from 0 to 40 percent and averaging about 15 to 20 percent.

644 Lockridge Canyon

This project is located in the Trapper Creek drainage on the east slope of the Pioneer Mountains. The project area contains 759 acres of sagebrush range with a perennial grass understory. In the spring of 1972, we plan to spray 444 acres of sagebrush. There are 315 acres reserved for key winter deer range or for unspray zones to protect streams or other vegetative types. Douglas-fir stands border the proposed project area and are used by game as cover. In general, the project is on a south exposure with slopes ranging from 0 to 45 percent and averaging about 15 to 20 percent.

717 Rattlesnake

This project includes a portion of the Rattlesnake drainage and several of the smaller tributaries that feed into Rattlesnake Creek. The project area lies on the south end of the Pioneer Mountains and contains approximately 4,800 acres of sagebrush range with a perennial grass understory. In the spring of 1973, we plan to spray 2,226 acres of dense sagebrush on the most productive sites. We will leave 2,574 acres of sagebrush type in scattered blocks and unspray zones adjacent to streams and other vegetative types. Sagebrush control will be done in various size blocks dispersed throughout an area of about 14,000 acres. The project is generally on a south and east

Lockridge Canyon
Spray Project #6544
Acres
Trapper Creek Allotment
Dillon Ranger District
Beaverhead National Forest

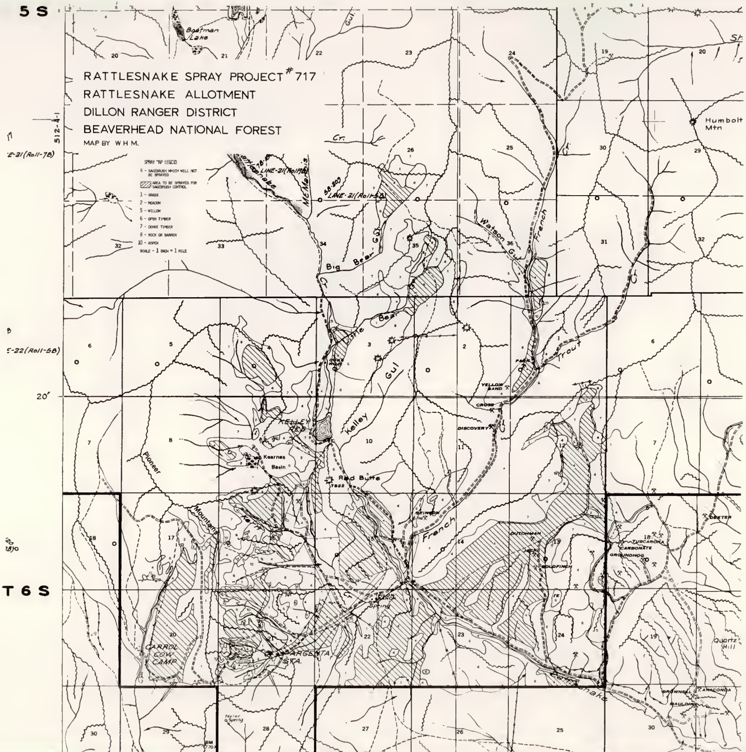
LEGEND

SPRAY TRIP LEGEND

0 - SAGEBRUSH WHICH WILL NOT BE SPRAYED

SPOTS NEAR TO BE SPRAYED FOR SAGEBRUSH CONTROL

1 = BRUSH
2 = MEADOW
3 = MEADOW
4 = SPOT TIMBER
5 = SPARSE TIMBER
6 = ROCK OR BARREN
10 = ASPEN
HOLE = 3 INCH = 2 HOLE



5 S
T 6 S
RATTLESNAKE SPRAY PROJECT # 717
RATTLESNAKE ALLOTMENT
DILLON RANGER DISTRICT
BEAVERHEAD NATIONAL FOREST
MAP BY W H M.
SPRAY MAP LEGEND
4 - SAGEBRUSH WHICH WILL NOT BE SPRAYED
AREA TO BE SPRAYED FOR SAGEBRUSH CONTROL
1 - GRASS
2 - MEADOW
5 - WILLOW
6 - OPEN TIMBER
7 - DENSE TIMBER
8 - ROCK OR BARREN
10 - ASPEN
SCALE - 1 INCH = 1 MILE
Boatman Lake
Humbolt Mtn
Big Bear Gu
Watson Gu
French Cr
Trout
Kelley Gul
Kelley Res
Kearns Basin
Red Butte 7522
Pioneer Mountains
Yellow Band
Cross
Discovery
Dutchman
Goldfinch
Tuscarora
Carbonate
Groundhog
Dexter
Quartz Hill
Carrol Cow Camp
Argenta Sta.
Rattlesnake
Brownell
Anaconda
Taylor Spring
20'

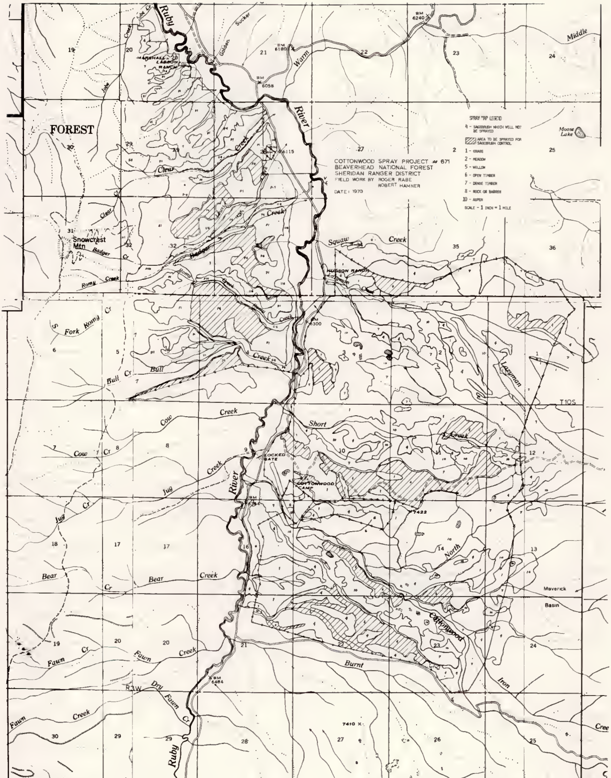
exposure with slopes varying from flat to about 50 percent and averaging about 20 percent.

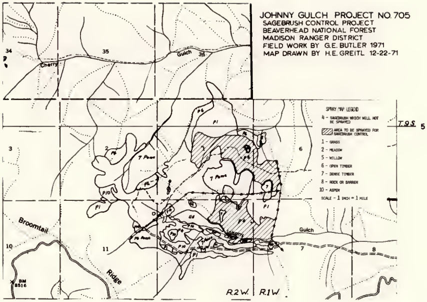
671 Cottonwood

This project includes portions of smaller tributaries that feed into the Ruby River. The project area lies on both sides of the Ruby River and includes portions of the lower slopes of the Gravelly Range on the east side of the river and the lower slopes of the Snowcrest Range on the west side of the river. The project area contains approximately 2,448 acres of sagebrush range with a perennial grass understory. In the spring of 1972, we plan to spray 1,000 acres of dense sagebrush on the most productive sites. We will leave 1,448 acres of sagebrush within the project area for primary deer winter range, low density stands, and unsprayed zones adjacent to streams and other vegetative types. The sagebrush control will be done in various sized blocks dispersed throughout the project area on the benches above the river. The spray areas are either on an east or west exposure on gentle slopes ranging from 5 to 30 percent and averaging about 15 percent.

705 Johnny Gulch

This project is located at the upper end of Johnny Gulch which is a tributary to the Madison River and lies along the east slope of the Gravelly Range. The project area contains 365 acres of sagebrush range with perennial grass understory. In the spring of 1973, we plan to spray 252 acres of dense sagebrush on the most productive


COTTONWOOD SPRAY PROJECT # 671
BEAVERHEAD NATIONAL FOREST
SHERIDAN RANGER DISTRICT
FIELD WORK BY ROGER RABE
ROBERT HAMNER
DATE: 1970
SPRAY MAP LEGEND
4 - SAGEBRUSH WHICH WILL NOT BE SPRAYED
AREA TO BE SPRAYED FOR SAGEBRUSH CONTROL
1 - GRASS
2 - MEADOW
5 - WILLOW
6 - OPEN TIMBER
7 - DENSE TIMBER
8 - ROCK OR BARREN
10 - ASPEN
SCALE - 1 INCH = 1 MILE
FOREST
Snowcrest Mtn
Ruby River
Moose Lake
MARSHALL LABRON RANCH
HUDSON RANCH
LOCKED GATE
COTTONWOOD CAMP
Maverick Basin
T10S
R3W



JOHNNY GULCH PROJECT NO. 705
SAGEBRUSH CONTROL PROJECT
BEAVERHEAD NATIONAL FOREST
MADISON RANGER DISTRICT
FIELD WORK BY G.E. BUTLER 1971
MAP DRAWN BY H.E. GREITL 12-22-71
SPRAY MAP LEGEND
4 - SAGEBRUSH WHICH WILL NOT BE SPRAYED
AREA TO BE SPRAYED FOR SAGEBRUSH CONTROL
1 - GRASS
2 - MEADOW
5 - WILLOW
6 - OPEN TIMBER
7 - DENSE TIMBER
8 - ROCK OR BARREN
10 - ASPEN
SCALE - 1 INCH = 1 MILE
Cherry
Gulch
Broomtail
Ridge
Johnny
Gulch
T.9S.
R.2W.
R.1W.

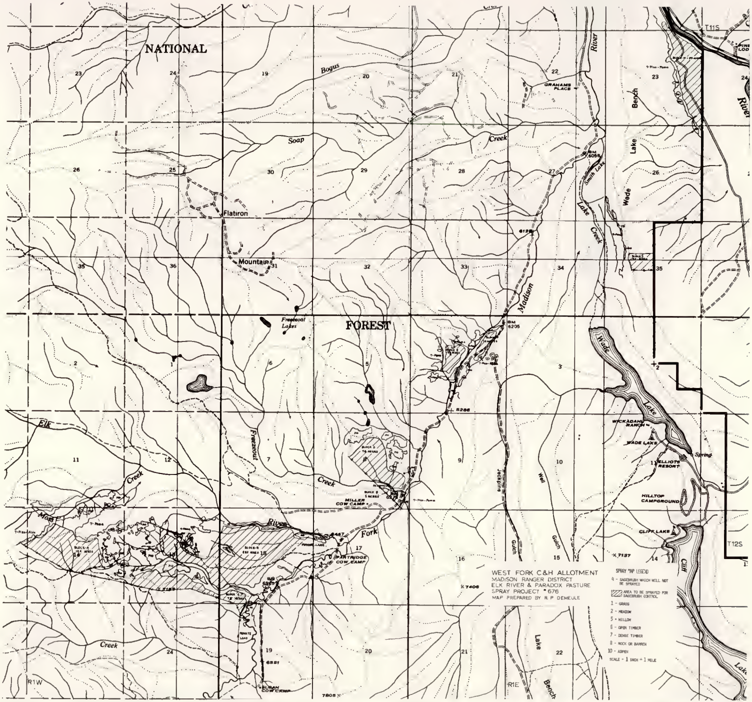
sites. We will leave 113 acres of sagebrush as unsprayed zones adjacent to other vegetative types. The project area is largely open country with small clumps and stringers of Douglas-fir on the north slopes and in the bottoms of the drainages. The spray areas are either on a north or south exposure on gentle slopes ranging from 5 to 20 percent and averaging about 15 percent.

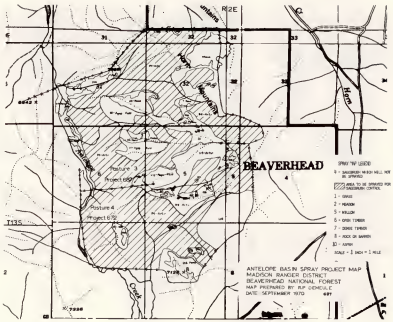
676 Landon

This project is located on the benches and lower slopes near the mouth of the West Fork of the Madison River and lies along the east slope of the Gravelly Range. The project area contains 1,832 acres of sagebrush range with perennial grass understory. In the spring of 1972, we plan to spray 836 acres of dense sagebrush on the more productive sites. We will leave 996 acres of sagebrush within the project area as unsprayed zones to protect streams and other vegetative types and also areas that have been identified as important for elk calving areas. The spray areas are generally on an east exposure on gentle slopes ranging from flat to 25 percent and averaging about 15 percent. This project will complete the sagebrush control program in the West Fork of the Madison drainage.

687 Antelope Basin

This project is located on the slopes and rolling hills in the Antelope Creek drainage and lies on the southeast end of the Gravelly Range. The project area contains 970 acres of sagebrush range with a perennial grass understory. In the spring of 1972, we plan to spray 810 acres


WEST FORK C&H ALLOTMENT
MADISON RANGER DISTRICT
ELK RIVER & PARADOX PASTURE
SPRAY PROJECT #676
MAP PREPARED BY R P DEMEULE
SPRAY MAP LEGEND
4 - SAGEBRUSH WHICH WILL NOT BE SPRAYED
AREA TO BE SPRAYED FOR SAGEBRUSH CONTROL
1 - GRASS
2 - MEADOW
5 - WILLOW
6 - OPEN TIMBER
7 - DENSE TIMBER
8 - ROCK OR BARREN
10 - ASPEN
SCALE - 1 INCH = 1 MILE
NATIONAL
FOREST
Bogus
Soap
Creek
Flatiron
Mountain
Freezeout Lakes
Madison
River
Smith Lake
Lake Creek
Wade Lake
Cliff Lake
Lake Bench
Wade
GRAHAMS PLACE
WICKADAHL RANCH
WADE LAKE
ELLIOTS RESORT
HILLTOP CAMPGROUND
CLIFF LAKE
Spring
Jackpine Gulch
Well Gulch
Elk Creek
Freezeout Creek
River
Fork
MILLER COW CAMP
PARTRIDGE COW CAMP
SLOAH COW CAMP
T11S
T12S
R1W
R1E
BM 6056
BM 6205
6128
5286
X 7137
X 7406
7805 X
6551
6447

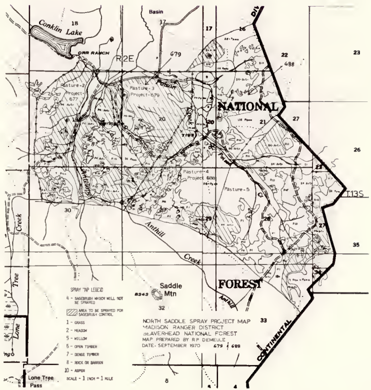

R2E
T13S
BEAVERHEAD
Project 1
Project 2
Project 3
Project 4
Project 5
ANTELOPE BASIN SPRAY PROJECT MAP
MADISON RANGER DISTRICT
BEAVERHEAD NATIONAL FOREST
MAP PREPARED BY R.P. DEHOLLE
DATE: SEPTEMBER 1970

of dense sagebrush stands on the more productive sites. We will leave 160 acres of sagebrush as unspray zones to protect other vegetative types and also stands of low density sagebrush. The project area is in open country with an occasional clump of Douglas-fir on the ridges and patches of aspen in the swales. The spray areas are on a west exposure on gentle slopes ranging from 5 to 30 percent and averaging about 20 percent.

679 North Saddle Pasture 3 and 688 North Saddle Pasture 4

These two projects join each other and are the second and third year of a project that is being sprayed in stages over a four-year period. The project area is located on Antelope Creek and Poison Creek drainages on the southeast end of the Gravelly Range. Project number 679 contains 322 acres of sagebrush range with perennial grass understory. In the spring of 1972, we plan to spray 226 acres of sagebrush on the more productive sites and will leave 96 acres of sagebrush as unsprayed zones to protect streams and other vegetative types.

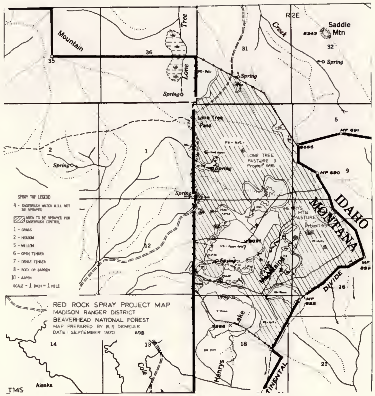
Project number 688 contains 375 acres of sagebrush range with perennial grass understory. In the spring of 1973, we plan to spray 125 acres of dense sagebrush on the more productive sites. We will leave 250 acres of low density sagebrush stands and unspray zones to protect streams and other vegetative types. The spray areas are on a northwesterly exposure on slopes ranging from 5 to 30 percent and averaging about 20 percent.



Conklin Lake
ORR RANCH
R2E
Basin
679
688
Pasture-2
Project-677
Pasture-3
Project-679
Pasture-4
Project 688
Pasture-5
NATIONAL
FOREST
T13S
Antelope
Anthill
Creek
Saddle
Mtn
8343
Lone Tree
Pass
CONTINENTAL
SPRAY MAP LEGEND
4 - SAGEBRUSH WHICH WILL NOT BE SPRAYED
AREA TO BE SPRAYED FOR SAGEBRUSH CONTROL
1 - GRASS
2 - MEADOW
5 - WILLOW
6 - OPEN TIMBER
7 - DENSE TIMBER
8 - ROCK OR BARREN
10 - ASPEN
SCALE - 1 INCH = 1 MILE
NORTH SADDLE SPRAY PROJECT MAP
MADISON RANGER DISTRICT
BEAVERHEAD NATIONAL FOREST
MAP PREPARED BY R P DEMEULE
DATE- SEPTEMBER 1970 679 & 688

698 Red Rock

This project is located on the head of several unnamed tributaries that drain into the Red Rock River on the south end of the Gravelly Range. The project area contains 779 acres of sagebrush range with perennial grass understory. In the spring of 1972, we plan to spray 660 acres of dense sagebrush on the most productive sites. We will leave 119 acres of sagebrush as unsprayed zones to protect other vegetative types. The area is generally open grassland with occasional clumps of Douglas-fir on the ridges and aspen patches in the swales. The spray areas are on a westerly slope on slopes ranging from 5 to 30 percent and averaging about 15 percent.



Saddle Mtn
8343
R2E
Creek
Spring
Mountain
Tree
Lone
Spring
Lone Tree Pass
LONE TREE PASTURE 3 Project 696
HENRYS MTN PASTURE 2 Project 65
IDAHO
MONTANA
DIVIDE
MP 691
MP 690
MP 839
MP 682
Lake
Henrys
Cole
Alaska
T14S
SPRAY MAP LEGEND
4 - SAGEBRUSH WHICH WILL NOT BE SPRAYED
AREA TO BE SPRAYED FOR SAGEBRUSH CONTROL
1 - GRASS
2 - MEADOW
5 - WILLOW
6 - OPEN TIMBER
7 - DENSE TIMBER
8 - ROCK OR BARREN
10 - ASPEN
SCALE - 1 INCH = 1 MILE
RED ROCK SPRAY PROJECT MAP
MADISON RANGER DISTRICT
BEAVERHEAD NATIONAL FOREST
MAP PREPARED BY R.R DEMEULE
DATE SEPTEMBER 1970
698

APPENDIX II. LITERATURE CITED

APPENDIX II. LITERATURE CITED

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APPENDIX III. OTHER LITERATURE REVIEWED

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APPENDIX IV. LETTERS RECEIVED ON DRAFT STATEMENT

SCHOOL OF FORESTRY

University of Montana
Missoula, Montana 59801
(406) 243-0211

March 3, 1972

Mr. Steve Yurich, Regional Forester
U.S.D.A. Forest Service R-1
Missoula, MT 59801

Dear Mr. Yurich:

This letter is in reply to the 1940 Environmental statements in the U.S.D.A. Draft Envrionmental Statement on Herbicide Control of Sagebrush with the herbicide 2,4-D, Beaverhead National Forest.

I'll begin with specific comments tied to page and paragraph or section and finish with general comments.

Page 3, Paragraphs 1 & 3

There are some contradictions in these two paragraphs. If these stands of sage were once dominated by grass why is the expected life of the program effects 5-20 years? I can appreciate the latter as being true and in fact what does happen, but why? Two questions come to mind. Are you on this project seeking to control sagebrush on those sites where grass is the original dominant or is there a mixture of sites with some originally containing a large amount of sagebrush? Secondly, if grass is the supposed dominant why the short life? Is it lack of grazing management control? This certainly shortens the life of the project effects. Paragraph 4 to some extent explains this (see general comments).

Page 4, Paragraph 1

Purpose number 3 may be the most important since it leads to the other 2.

Page 5, Paragraph 5

Measure number 1 to minimize environmental impacts mentions amount needed to kill sagebrush. On page 15, paragraph 2 you state an expected kill of 65-95%. Perhaps the statement should be modified or a new statement added that complete kill is not sought in this project. This in itself serves to reduce the environmental impact. I hope you're not after a 100% kill!

Page 6, paragraphs 2 & 4

Under economic and social impact there is an indication in paragraph 4 that an increase in carrying capacity has already been agreed on rather than the stabilization alternative.

Page 8, Paragraph 1

You assume a straight level line projection for increase in herbage production for 20 years. I hope it is. If however, the life of the project is 20 years, there is a tapering off of production towards the end.

Page 7, H1 Project Costs and
Page 11, M Subsequent Management

Subsequent management is to be rest rotation or deferred rotation; this implies control and control I assume to mean fences. Are they already in? If so, then alternative 7 on page 46 is viable indeed. If not, then your project costs are incorrect. Fences do have an impact on people, wildlife, costs, and life of the project effects. Without management control your project life of 20 years is double what it ought to be.

Page 11, N History of Program

Since about 130,000 acres have been sprayed, what is the status of reinvasion by sage and reduction in production?

Page 25, Paragraph 2

Edge effect may be desirable but is the layout such as to enhance edge effect or is it blocked in?

General Comments

As you may have noticed I made no comments relative to 2,4-D use as a herbicide. I find no objections to its use on the areas listed and under the conditions listed in the statement. I have one real reservation about its use and that is that control be only on the productive areas and to me this means soil typing before treatment even though plants are general indicators of productivity. I am opposed to 100% kill on big sagebrush and especially the attempt to do so. I am concerned about the ability of scientists and administrators to separate sites that were originally sagebrush dominated from those originally dominated by grasses.

I am particularly disturbed at any reduction in the forb component unless it represents a shift toward the original vegetation; over the long run it is adequate.

Lastly I am disturbed about the assumed level of management following control of sagebrush. The long term commitment to adequate grazing management control, to protect the resource, has been negated too often in my estimation to warrant programs of this type. If the livestock interests fail to cooperate adequately in the management plans for the area to achieve maximum length in the program's vegetation effects

I am opposed to such programs. I am not impressed by livestock interests that have brought pressure on federal agencies and destroyed the grazing resource and then following restoration attempt to go through the same process again. What I'm saying is that unless you fund and equip the areas for long term proper management at the local level, I'm opposed to the projects.

I do believe that Montana's rangeland needs improving on a planned program basis, in which herbicides can play a role.

Best regards,

Lee E. Eddleman

Lee E. Eddleman
Assistant Professor
Range Management

LEE/bjs

cc: Burk (3/23)

State of Montana

State Department of Health

JOHN S. ANDERSON M.D.
Director

Air & Environmental Sciences
HELENA, MONTANA 59601

March 9, 1972

In: This should be sent to EE Budget. 2360 Jud

Mr. Steve Yurich
Regional Forester
U.S. Forest Service
Region 1
Missoula, Montana 59801

Dear Mr. Yurich:

Upon review of the Draft Environmental Statement for the Northern Region's program of sagebrush control with herbicide 2,4-D, I would like to make the following comments.

1. According to the Impact Statement, it is anticipated that accepted sanitary landfills will be usedto dispose of empty herbicide containers. The Department of Health and Environmental Sciences recommends that before using a state-approved sanitary landfill for the disposal of empty herbicide containers, that soils, hydrology and topographical characteristics of the intended landfill be considered. Many of the state approved sanitary landfills have no record of a thorough soils and hydrology survey, other than the county soil surveys conducted by the Soil Conservation Service districts. These surveys only consider the soils to a depth of five feet and usually do not take into consideration the specific landfill soils. In addition, to minimize the possibility of ground-water and surface water contamination, it is imperative that the soils and water table in the exact area of the landfill in which the herbicide containers will be disposed of be considered. Also, general operational procedures of the sanitary landfill should be reviewed to determine the reliability of the landfill operator in handling toxic wastes. The landfill operator should be notified of the pesticide containers and their potential hazards and should be instructed that these containers should be buried immediately upon receipt. We recommend that the U.S. Forest Service confer with the Departments of Health and Environmental Sciences and Agriculture on this matter.

2. The Department of Health and Environmental Sciences feels it would be beneficial if the U.S. Forest Service consulted the Pesticides Study Program, Department of Health and Environmental Sciences and the Pesticide Control Division, Department of Agriculture on the safety procedures and precautions needed to minimize the impact of 2,4-D exposure on human health. Since flagmen will be used on this project, it is imperative that they be protected from accidental exposure from the aerial spray.

3. This Impact Statement does not appear to have written in measures to control livestock use after the "one-year loss of grazing" season is up. If encroachment of sagebrush is due to overuse of grazing land by livestock reducing the palatable forage plants and creating soil disturbances, it seems to me that the Forest Service should impose extended restrictions on the numbers of livestock to graze the treated areas after the one-year non-use season.

Sincerely yours,

Kit C Walther

Kit C. Walther
Project Officer
Pesticides Demonstration Study Program
Environmental Sciences Division

KCW:ah

cc: Lloyd F. Meyer, Department of Planning and Economic Development, Capitol Station, Helena

Bum 3/23/

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
HEALTH SERVICES AND MENTAL HEALTH ADMINISTRATION
ROCKVILLE, MARYLAND 20852

February 29, 1972

National Institute for Occupational Safety & Health

Mr. Steve Yurich
Regional Forester, Region 1
U. S. Department of Agriculture
Forest Service
Missoula, Montana 59801

your ref. 1940(2200)

Dear Mr. Yurich:

This is in reply to your February 25 letter addressed to Dr. Raymond T. Moore, Acting Commissioner of the Environmental Control Administration, concerning a draft environmental statement for the Northern Region's program of sagebrush control.

The Environmental Control Administration ceased to exist in Dec. 1970 when the new Environmental Protection Agency was established, and herbicide activities are carried out by EPA. There would be no point in asking Dr. Moore to review the statement for a non-existent organization and it is therefore being returned.

Sincerely yours,

Kathleen C. Hart

Secretary to Associate Director
for Washington Operations, NIOSH

Enclosure

cc: Reed 3/23

F. S. K-1
RECEIVED
MAR 13 1972
RANGE & WILDLIFE MANAGEMENT

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

INT Bozeman

March 10, 1972

REPLY TO: 1940 Environmental Statements (2200)

SUBJECT: Herbicide Control of Sagebrush

TO: Steve Yurich, Regional Forester
R-1, Missoula

I appreciate the opportunity to review the attached environmental statement.

Perhaps the thing that concerns me most is the method by which the Benefit-Cost ratio was computed. Supposedly, this ratio is the basic justification for conducting such land improvement projects. I am no economist, but it seems wrong to compare only immediate costs of doing the job with benefits accumulated over a 20-year period. Isn't it more realistic, and honest, to compare benefits with the 20-year cost if the $6.81 were invested at 5% rather than using it to kill sagebrush? There are, of course, many benefits that do not lend themselves to dollar quantification, but there are an equal, if not greater, number of costs in the same category!

Another point that is bothersome is the lack of clearly defined criteria for selecting areas to be sprayed. What constitutes an "undesirable" amount of sagebrush cover? Is this just a gut feeling--if so, whose gut? I think we all have seen areas sprayed that didn't have enough sagebrush to warrant the action.

My additional comments follow:

<u>Page 3, sentence 1</u>.--Neither Evanko and Peterson, Wright and Wright, nor the Peek references will stand scrutiny as verifying that sagebrush has greatly increased because of livestock grazing! Only two of Evanko and Peterson's study sites had sagebrush, and these in amounts too small to justify any kind of conclusion. (However, if these areas sampled over 20 years ago were resampled now, perhaps supportive evidence could be obtained.) Peek merely states that Evanko and Peterson suggest (unfounded on their data) that grasslands (without sage?) are climax. As I recall, Wright and Wright dealt with valley and plains sites that are not at all typical of the Beaverhead areas. I am not saying sagebrush has not increased; I only say that the above references do not support this statement.

<u>Page 4, paragraph 1, Item 3</u>.--This cannot be justified as an objective because spraying kills so many of the forbs, and particularly in view of the questionable status of sagebrush in the "climax" vegetation.

Page 5, Item 1.--This "minimum" amount of 2,4-D depends upon the degree of control desired, which is not stated. Is a 98% kill sacred, or would 50% kill be more desirable in some areas?

Page 5, Items 3 and 4.--It might help to make a few points by briefly saying why helicopters will be used and why with winds below 6 mph. Not everyone is aware that this is to insure precise placement of the chemical and to avoid drift as much as possible.

Page 6, paragraph 2, sentence 5.--A shorter period of time than what? Than by good management? Or is there fear of giving an impression that spraying is a substitute for good management?

Page 8, paragraph 1, last sentence.--This statement conflicts with the one on page 3, paragraph 3, stating that effects on vegetation will last 5 to 20 years. Let's assume that a 20-year effect is correct: then in 20 years sagebrush should be as thick as before spraying, and the grass increase drop to "0", which means simply that the area would no longer be supporting an additional 0.62 AUM. There is a large credibility gap here created by a distortion of facts.

Pages 14 and 23.--On favorable and unfavorable impacts of sagebrush eradication: If you haven't done so already, I suggest that you read pages 79 and 80 in Daubenmire's "Steppe Vegetation of Washington (Wash. Agr. Exp. Sta. Bul. 62, 1970).

Page 23.--On soil: Is there a valid basis for stating that these are likely benefits, or is this merely wishful thinking? In other words, can these statements be substantiated?

Page 23.--On Vegetation: There probably is a benefit from an increase in total production of herbaceous species, but certainly not from a species variety standpoint. Should be more definitive on this.

Page 29.--You may wish to look at the following reference with regard to alternative control methods:

Mueggler and Blaisdell, 1958. Effects on associated species of burning, rotobeating, spraying, and railing sagebrush. J. Range Manage. 11(2): 61-68.

Walter F. Mueggler

WALTER F. MUEGGLER
Principal Plant Ecologist

Enclosure

cc. Bird 3/23

MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

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CONSERVATION DISTRICTS DIVISION

March 13, 1972

TO: Steve Yurich, Regional Forester

FROM: Peter V. Jackson, Chief
Grass Conservation Bureau
Conservation Districts Division

Peter V Jackson

SUBJECT: Environmental Statement on the Northern Regional Program of Sagebrush Control with the Herbicide 2-4D.

I would like to compliment your agency for a very careful and well-studied Environmental Statement. In going over the list of persons and organizations who were sent Environmental Statements, I noticed that both the President and Executive Secretary of the Montana Stockgrowers were included, but only the President of the Montana Woolgrowers was listed. I feel that Dave Smith, Executive Secretary, of the Montana Woolgrowers is very interested and would have a very good report for your consideration. The Ennis Chamber of Commerce also was not listed. This group was recently re-organized and is becoming extremely active. I believe that they would like to see the report and perhaps even comment on it.

For my first comment on the text of the Environmental Statement, I would like to note that on page 6 you refer to the adverse economic impact on private lands when livestock is removed from the forest during spray periods. This situation is definitely damaging to private land as it nearly doubles the pressure on some ranches for a period of time.

I would like to refer to my own personal situation in the Willow Creek Grazing Association of the Madison Ranger District where we were asked to stay off the land for two consecutive years. I feel that this did a certain amount of damage to private lands. As a thought to be considered, at one time a 200 head allotment in Beaverhead County became available. I am wondering if, should this situation occur again, that perhaps an allotment could be saved that would be available to permittees during the period that their own ranges were being sprayed. As I said before, this is only a thought that may be worth considering should it happen again.

My opinion on the cost and return figures that are stated on pages 7-9 is that they are certainly very conservative and based on what experience I have, I am sure that the net return will very easily be as much or more than you have listed.

In your discussion on the sagebrush kill in sprayed areas, you state that the percentage of kill is 65 to 90%. I believe this is very close; however, in the spraying projects I have observed, 75% was about as high as I have seen. With this in mind, I feel there is little concern for the total kill of sagebrush and there will be more than ample left in the area for the protection and use by certain birds and animals. As for the kill of forbes and other broad leaf plants and shrubs, I feel that this is not a serious problem as they will return in sufficient numbers in a short period of time. It is my opinion that it is very unreasonable to expect to gain sagebrush control without a certain amount of forbes and other woody plants being temporarily lost.

It is quite interesting to note that the consideration of smell and noise was a factor in an Environmental Statement. I consider the smell of sage just as repulsive as 2-4D or diesel fuel, but this of course is a persons's own opinion. In my own experience with spraying 2-4D on my ranch, I have found that it is very hard to detect any odor after 24 hours. Therefore, I consider this a very minor item.

Another point I considered, with a certain amount of humor, was the disturbance of wildlife. Again, I would like to cite, as an example, a personal experience with a moose and her twin calves who were grazing in an area where I was cutting poles on the U.S. Forest. For the first two days the mother left with her calves every morning when we arrived, but on the third day she stayed in the area where she was grazing and never left when our chain saw started and stayed during the entire period of our falling and hauling of the poles. Perhaps on the same subject, on page 36, you note leaving unsprayed areas or spots for the calving of elk. Here again, I feel you are bending over backwards to be fair to everyone. I feel that a few spots of sage that will be left in the best of condition will be ample for calving.

I would like to make one comment in reference to Sage Grouse. After reading your Environmental Statement carefully, I feel sure that there is more than ample sage left for the needs of the Sage Grouse and except for limited crucial strutting grounds, I feel that the economic benefit of Sage Grouse hardly stands up to the need for special areas being left for their exclusive use.

In your discussion of chemicals on page 43, I would have personally liked to have read a more detailed discussion of other chemicals that may have been used as alternates for 2-4D. I do feel your discussion was ample to cover the situation and 2-4D at the present time is without a question the only logical spray to use.

In your discussion of intensive grazing systems alone as an alternative to spraying, I agree that rest or deferred rotation grazing systems are capable of improving the vegetation, but my personal experience has been that they are decidedly too slow when you are working with areas with more than 25% sagebrush cover. Therefore, it is my opinion that herbicides such as 2-4D are definitely necessary and should not be substituted in this type of program.

In reference to item 8, page 47, the removal of domestic livestock as an alternative, I would like to quote from the Society of Range Management's Benchmarks (A Statement of Concepts and Positions) Livestock Section:

> "The Society for Range Management recognizes that because of the inherent nature of rangelands, livestock grazing is most often a principal rangeland use, and that the production of animal protein from rangeland is of vital importance in meeting the nutritional needs of an expanding world population.
>
> "The Society further recognizes the value of livestock as a potent management tool to bring about desired trends or changes in plant communities to achieve objectives in watershed management, wildlife habitat improvement, or enhancing recreational and aesthetic qualities."

On page 50, I would like to suggest an addition as one of the long term products from the treated areas. I feel that these treated areas will serve as examples to other land owners of the beneficial effects of these control programs and that they will become very valuable as educational examples to the surrounding area. In my experience working with people, and particularly ranchers, one good demonstration area equals many meetings, pamphlets and slide presentations.

In conclusion, I consider the report to be an excellent one but I do feel that the Forest Service has bent over backward to be fair to every little group of people who might come in with statements, complaints and suggestions. Frankly, I feel that in every big on-going project some groups will get hurt in spite of every precaution that can be taken.

I personally have great faith in the system of professional land managers and I feel that as intelligent citizens we should leave the land management decisions to these highly qualified people until such time that it is proven without question that they are making unfit decisions and performing damaging practices. Only then do I feel that the public should attempt to assist in the management of our public lands.

PVJ/jc

cc, Bird 3/23

Cooperative Extension Service
MONTANA STATE UNIVERSITY U.S. DEPARTMENT OF AGRICULTURE, AND MONTANA COUNTIES COOPERATING

MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA 59715

March 14, 1972

Mr. Steve Yurich, Regional Forester
Northern Region, US Forest Service
2705 Spurgin Road
Missoula, Montana 59801

Dear Mr. Yurich:

I greatly appreciate the opportunity you have afforded me to reply to the Draft Environmental Statement on Herbicidal Control of Sagebrush. I have a number of much thought about comments concerning the statement that I sincerely hope your staff will give due consideration before proceeding with the projects described within the statement. Many of the comments I make are accompanied with numbers in parentheses. These numbers cite the page or pages in the draft statement referring to the points I am discussing in my text.

The most logical starting point for this discussion is with the considerations for the effects herbicide spraying will have on the vegetation, since the present vegetation is the target of the spraying. It is stated (28) that, "The most serious adverse effect on the sagebrush-grassland vegetation is that 2,4-D kills many forbs and other shrub plants." This statement is not correct. The most adverse effects will result from the killing of the sagebrush. Sagebrush is the dominant species, therefore alteration of its composition will have the greatest influence on the ecosystem. Many of these influences could be argued scientifically to be adverse.

Sagebrush spraying certainly cannot be justified by assuming sagebrush to not be the climax vegetation (3). Some sites are undoubtedly suited for sagebrush dominance in the climax condition. Sagebrush is adapted for climax occupation over most of Southwestern Montana. While not always the natural dominant, it is absurd to suggest that this is never the case. Whether or not sagebrush is the climax dominant is irrelevant anyway. Total biomass production is a more important question. I suggest that in the natural ecosystems of Southwestern Montana that total biomass is greatest with sagebrush dominance.

I am confused with conflicting statements concerning spraying effect on productivity. It is emphasized that without spraying it would take decades to reach climax condition (48), yet elsewhere (25) it is pointed out that the effects of the spraying project are only temporary. Why are the results temporary if sagebrush is not the climax dominant? It appears then an admission has been made that sagebrush is the climax dominant. Also, how can you economically justify spraying if the results are so temporary? If the areas to be sprayed have such a good understory cover of vegetation (27)

to the point that killing of the sagebrush will present no erosion hazard, how can you economically justify spraying and claim that sagebrush control is needed for erosion control purposes?

To say the long term visual change brought about by sagebrush spraying is a favorable effect (24), is a personal bias. I am sure that a majority of the public would prefer a natural vegetative pattern to that of an artificial mosaic created by spraying. The remoteness of these areas increase their aesthetic value instead of easing the effect of the adverse visual consequences (30).

Sagebrush spraying has been too often justified by claims that it would result in improved watershed conditions. However, these claims are not always valid. To make a blanket statement that spraying will give favorable effects on soil (11) is absurd. On certain sites with the right combination of soils, topography, climatic pattern, etc., this is correct, but it is not correct on a majority of sites. There is no research pertaining to most conditions in Southwestern Montana providing evidence that removal of sagebrush will remove erosion hazards. It is not always the case that water infiltration into the soil will increase after sagebrush removal (19). This can be just the opposite and varies with such factors as intensity of storms, nature of precipitation, etc. I would also like to know what an improved soil structure (23) is and what it is good for. This really depends on management objectives and a broad generalization cannot be made.

It is stated that a decrease in plant cover has lead to increased erosion (3). This has not resulted due to an increase of sagebrush, but to an overuse by grazing animals through previous mismanagement. I believe that total cover on USFS lands in Southwestern Montana is greatest on areas with good stands of sagebrush. This is further substantiated by your report (27). Just because the majority of cover provided by sagebrush is further off the ground than the understory vegetation does not mean it provides no ground protection. It is simply not responsible to state that sagebrush control will reduce soil erosion (5), because this is not always the case.

The effects that sagebrush control have on wildlife populations in the area are of great importance. Certainly, the long term effects on these populations are not favorable as stated (25). A great deal of research verifies this and Montana's Fish and Game Commission should be consulted for help on this aspect of the proposed projects. Any improvement of range condition has to be limited to livestock and then more specifically to cattle (11). The important game animals and other principal wildlife species will suffer with sagebrush control. There are too many unknown effects on wildlife (21) and I certainly disagree with a number of opinions expressed as to the influences sagebrush control will have on wildlife species (21). Sagebrush control will definitely hurt deer, antelope and elk crucial winter range (21). Deer and antelope need sagebrush throughout the winter period and elk definitely need it during the most severe and critical times of the winter. Sagegrouse do use sagebrush in the summer for both food and cover (35).

I cannot agree that ill-effects on wildlife are only temporary (31). This is a guess and most likely the absence of wildlife populations will facilitate the further exploitation of their former habitat until they will not be able to reappear. In reference to a statement that coyotes will be helped by availability of rodents for prey immediately following sagebrush control (36), how can anything so temporary help a population of coyotes.

The implication that big game animals will benefit from an edge effect resulting from spraying is incorrect (25). The edge effect is certainly a very real phenomenon concerning animal-cover relationships. However, to be significant, the units of cover have to be larger in dimensions than the animal species to receive the protection of the cover unit. I disagree that deer can necessarily find substitute areas (37). Animal territorial behavior has to be considered along with saturation densities and basic habitat requirements. The next logical question is, what will the deer do when the adjacent areas are earmarked for treatment? The consideration given to wildlife by the draft statement is inadequate and often misleading.

On a long-term basis the economy of Southwestern Montana may suffer, not prosper, from sagebrush control (4). It is conceivable that eventually recreation derived income in that area could exceed increased livestock inputs. Recreation will have a better chance to prosper if wildlife, especially game animals, flourish and aesthetic values remain high. Odds are best for this prosperity if sagebrush control is not practiced. The benefit-cost ratio (9) has not accounted for negative economic effects as it was provided chiefly by relatively local individuals and groups. This seems quite strange when it is considered that the land involved is public and owned equally by all citizens of the United States. I am afraid that many of the inputs were biased by personal short-term economic advantages to be gained.

I find it difficult to accept that the projects discussed will have no irreversible or irretrievable commitment of resources (52). Even if this is true, can the public wait 20 (+) years to again reap what they desire if it is not what is called for in these projects?

Sincerely yours,

Carl L. Wambolt

Carl L. Wambolt Ph.D.
Range Specialist
Montana State University

CLW:ksd

cc: Russell E. Train, T. C. Byerly, John Green, Edwin Zaidlicz, Mike Mansfield, Lee Metcalf, Frank Church, Eldon Smith, Don L. Brown, Robert Duncan, Fletcher Newby, James Posewitz, James Linne, Don McIntosh

(536)

SKYLINE SPORTSMEN'S ASSOCIATION, INC.

P. O. BOX 173 BUTTE, MONTANA 59701

March 22, 1972

RF	✓
MCG	✓
RSB	
FWP	
HFM	
RH	✓
EB	✓
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DAD	
PWC	
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LHS	
CLKS	

Steve Yurich, Regional Forester
U. S. Forest Service
Missoula, Montana

Dear Mr. Yurich:

Thank you for giving us the opportunity to comment on the program for sagebrush control with herbicide 2,4-D. First, kindly let us compliment the Forest Service on the improvement in the methods now used to apply the chemicals over the methods used a few years ago.

We are concerned, however, about certain effects spraying may have upon wildlife. From personal observation, we know that there are sagegrouse strutting grounds in Steel Creek. We presume you have located these grounds and marked them so they will not be sprayed, but will the surrounding nesting grounds not be destroyed?

Also, we have not been completely convinced that runoff does not cause injury to fish. During a field trip conducted by the Beaverhead Soil Conservation District last summer, Mr. "Babe" Buck who was raised in the Centennial Valley stated that years ago large fish inhabited Long Creek, but now no fish live in that creek. As no other event has changed the water of the stream, it is assumed that runoff containi ng 2,4-D killed these fish.

Livestock is kept off the sprayed areas for a year and because of this there is no danger of them being injured by increase of nitrate, but how about wildlife? They may wander on the sprayed areas and become affected.

The effects of the program on the vegetation are expected to last for a period of from 5 to 20 years. We have been told that after sagebrush has been eradicated, if a range is well-managed and not overgrazed that grass can compete with sagebrush so it becomes the dominant crop. The effect of the program should be permamen t.

Rabbit brush (Chrysothamnus graveolens or C. nauseosus) is not listed in Table 1, Mortality of Plants on Areas Sprayed

Steve Yurich, Regional Forester

with 2,4-D, yet it is a common forb in this area. What are the effects on it?

We know the intention of the program is to improve the range for livestock, wildlife, and watershed and the study made has been thorough, so we are asking these few simple questions.

Yours very truly,

SKYLINE SPORTSMEN'S ASSOCIATION

Rosco Nickerson

Secretary

cc: Burk

SCHOOL OF FORESTRY

University of Montana
Missoula, Montana 59801
(406) 243-0211

March 27, 1972

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Mr. Steve Yurich
Regional Forester
U.S. Forest Service
Region 1
Federal Building
Missoula, MT 59801

Dear Mr. Yurich:

I was pleased to have an opportunity to review the USDA Draft Environmental Statement on Herbicide Control of Sagebrush.

The report is a comprehensive one and certainly gives consideration to all aspects of the problem of using herbicides on rangelands. It may be too intensive and the main points may lose significance in the total analysis. It may be desirable to enlarge on sections VI and VII. Also, I would exphasize the monitoring of the projects to include management inspection to ensure objectives of treatment and biological studies to watch for any unsuspected adverse effects not known or anticipated.

The portion of the report that I feel needs reanalysis is the section on project discriptions. The acreage on most of the locations appears to be too large if each acreage is in a single treatment area or block. It is my feeling that there will be too much game habitat displacement and if certain plants or animals (small) are lost from the treatment area, recovery will be restricted. Also edge effect is minimized in large blocks. Perhaps, I do not fully appreciate the actual patterns achieved on the ground. But, I am opposed to anything resembling large square blocks.

Projects 631 Deadman Lake and 671 Cottonwood are in areas with very shallow clay soils and considerable Alkali sagebrush, Artemisia longiloba. While, I have seen some successful spraying east of Deadman Creek on this sagebrush, overgrazed areas may have little grass to take over after spraying. Perhaps this whole section would be improved with some vegetation maps and actual spray boundaries.

Sincerely yours,

Mel Morris

Melvin S. Morris
Professor of Forestry
Range Management

dls

cc: Burd

Box 190
Dillon, Montana 59725

March 27, 1972

Mr. Steve Yurich
Regional Forester
U. S. Forest Service - Region 1
Federal Building
Missoula, Montana 59801

Southwestern Montana Stockmen's Association Comments On Environmental

Statement On Herbicide Control Of Sagebrush

The Southwestern Montana Stockmen's Association is in favor of the continued use of Herbicides for Sagebrush Control. We recognize the following as benefits from these practices:

1. More forage production
2. Better watershed managemen
   a. Erosion control
      1. Reduced sedimentation
      2. Reduced thermal stream pollution
      3. More stable water supply
   b. More wildlife habitat
   c. Stable forage production for wildlife and domestic livestock
   d. Improve esthetic value
3. With Sagebrush control comes more intensive land management
   a. Improved land management practices (Rest - Rotation)
   b. Protection of critical habitat areas for big game and upland game birds, for better calving and big game reproduction
4. Stabilize season long grazing
   a. Increased grazing capacities while improving and maintaining range conditions.
   b. Providing 1/5 - 1/3 of next seasons forage

We feel that because of the improved management of public lands through the use of herbicides and other intensive management practices, public lands are becoming the reserve esthetically, economically, and ecologically as they were intended.

Sincerely,

Directors
Southwestern Montana Stockmen's Association

WESTERN MONTANA COLLEGE
OF THE
MONTANA UNIVERSITY SYSTEM
DILLON

March 24, 1972

Mr. Steve Yurich
Regional Forester
U.S.D.A.
Forest Service
Missoula, Montana 59801

Dear Mr. Yurich:

I have reviewed the Draft Environmental Statement on Herbicide Control of Sagebrush sent to me. My over all reaction is favorable to the proposed spray program provided that the program is followed as outlined. My main concern involved the identification and protection of vital wildlife habit areas. As stated on page 31, "all the known critical wildlife habitat areas have been identified and removed from the planned spray areas."

I know that we have a large amount of sagebrush in Beaverhead County and much of this has little use by deer, elk, antelope or sage grouse. Other preferred areas are highly critical, especially in winter. The latter should be identified as completely as possible, whether in proposed spray areas or not, and managed for wildlife utilization.

Some specific comments on the draft are as follows:

Page 5 F1. Concentration of 2, 4-D not clear -- 2 lbs./ gal. or 2 lbs./acre?

F5. Not all sagebrush areas are of equal density within spray boundaries, but plots tend to spray a complete swath even though they may have contracted for less than the total acreage. If feasible it would be better to leave those areas which have only a scattering growth of sage. This would permit the forbs to reestablish their numbers in a shorter period of time following spray treatment.

F6. Cold air drainage in the early a.m. will cause spray to roll down into stream bottoms if the grade is moderately steep. More than 100' minimum buffer zones should be left in these areas.

Page 19, end of paragraph D. Sagebrush also helps to hold drifting snow with every bush acting as a snow fence. This would help to increase soil moisture content in wind-swept areas.

Page 35, 36. 3 and 4. Increased availability of rodents to raptors and coyotes following the sagebrush spraying would be a very temporary condition.

One major area of concern which will probably be called to your attention by a number of persons is in reference to the use of names of many individuals and placing these in the specific categories of being for or against the use of 2, 4-D in sagebrush management. I am not sure just how this happened, but the three members of our department, Dr. Timken, Dr. Bandelier and I, are all in general agreement on sagebrush control practices. However, the draft lists Dr. Timken as being opposed to 2, 4-D control and Dr. Bandelier and I in favor of it. It would be better if we were listed as being favorable provided that wildlife values are preserved and adequate field studies conducted to insure their maintenance. I know that 2, 4-D contains certain contaminants which may be harmful to various forms of life, but I feel that, at our present state of knowledge, it is the best choice when control is necessary.

Sincerely yours,

Daniel G. Block

Daniel G. Block
Associate Professor of Biology

Dillon, Montana 59725
March 27, 1972

Mr. Steve Yurich
Regional Forester
U. S. Department of Agriculture
Forest Service
Missoula, Montana 59801

Dear Mr. Yurich:

As a member of the Rotary Club of Dillon, Montana, I was given a copy of the "Draft Environmental Statement on Herbicide Control of Sagebrush" to express reactions from that organization.

Page #25, H. Animals No reference made to Antelope, deer, or Sage Grouse.

Pages # 5-6 F. and Page #31 H. Animals Last two sentences at the bottom of the page: Assuming no ill effects to animals, birds, fish from the 2-4-D exposure one could find no fault with the presentation if one could always be sure that the groundwork details were taken care of. Numerous areas can be found where there have been drift and overreach beyond the original designated limits.

Some fieldwork should be done during the Winter months to observe the amount of snow cover as it relates to the height of the sagebrush at times when the sage protruding from the snow might be the only source of forage for some of the game animals. There are key areas where the sage should be left for such emergencies.

There is considerable objection to the technique (pages 54-55) of arbitrarily assigning groups and individuals to the wearing of a "white hat" or a "black hat" and making public identification of them. These names should not be included in the final document without specific consent.

Sincerely,

James E. Short

James E. Short
For the Dillon Rotary

BEAVERHEAD

County Commissioners

Dillon, Montana

MCG	mcg
RSB	
FWP	fwp
HPM	
RH	RH
EB	EB
JPI	
DAD	
FWC	
JLC	
LHS	
CLKS	

March 28, 1972

Mr. Stone Yurick
Regional Forester
Dear Mr Yurick

After studying your draft on the herbicide control of Sagebrush by your department & its effect on our environment, & your planned measures of control to minimize the environmental impacts of spraying, I would say that you have considered all aspects of it.

As a agriculture oriented County & livestock in particular, sage brush spraying is a necessary tool to increase the carrying capacity of the land.

As to the other methods of control mentioned, in the past years I have watched & compared these methods with spraying; & the results have been far greater by the use of 2-4-D.

By the use of good spraying methods such as you have outlined in your draft, it will not only increase the carrying capacity of the land, but also provide more

BEAVERHEAD

County Commissioners

Dillon, Montana

feed & cover for wildlife & in general would be benificial to all of us.

Yours Truly
Earl J. Mooney

cc: Bird

March 28, 1971
Helena, Mt.

505 Hellroaring
Helena

Region I Office
U.S. Forest Service

Sir:

I appreciate being able to comment on the Forest Service sagebrush spray program.

First, I feel you should be commended for your publication on the subject, which obviously culminates a lot of work and study. Nevertheless, I feel it falls short in a few spots.

For example, it seems to minimize the damage that sage removal may do to game populations. My father operates a ranch near Bannack in Beaverhead County, where extensive sagebrush eradication has been undertaken by both the Forest Service and BLM. As I recall, most of the land adjoining the ranch was sprayed about ten years ago. Within a year or two after the spraying, we noticed that the sage hen population on our place went from about one hundred to upwards of five hundred, as birds migrated from the sprayed areas.

The increased density of the sage hen population on our place soon brought large numbers of predators who found easy picking on the sage hen concentration. Possibly other biological controls also worked to normalize the population density. At any rate, the numbers declined steadily until they fell slightly below the population before the spraying was done. It seems clear that sage hens cannot successfully relocate in an adjacent area with a stable sage hen population, in the wake of spraying. If hunting were allowed, the reduction of habitat would also make the sage hens much easier pray.

The same is true of antelope, although to a lesser degree, apparently owing to their lesser dependence on sage brush.

Further, I think more studies should be done to determine the relative effectiveness of sage spraying in various types of soils. For many years I've kept an eye on various private sage brush eradication projects. Some were successful, with much better grass growing after removal of the brush. In other areas, there was evidence of a symbiotic relationship which was disturbed by sage removal. It appears that some types of grass grow better in some types of soil when sage is available to shade the ground and inhibit the evaporation of surface water. The deep roots of the sage appear not to take water from the shallower rooted grasses. Where this sort of relationship exists, no grass grows until the sagebrush regenerates, and dustbowl conditions may occur. We need to be smarter about such things.

Also, I wish I didn't have to be a Latin scholar to understand what types of plants are badly effected by 2-4-D. Why not use popular names where possible? I worked on a Forest Service crew in 1964 1965, spraying sage in the upper Ruby, the West Fork of the Madison, and near Lima. I recall that although we took every precaution, we defoliated a lot of quakenaspen, rose bushes, and streamside plants. I haven't returned to see if these plants regrew their leaves, but I'm told they didn't, for the most part. If new spraying regulations have not been evolved since then, they should be.

Sincerely,

MCG	
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Steve Yurich
Regional Forester
Region 1
USDA Forest Service
Missoula, Montana
59801

March 25, 1972

Dear Mr. Yurich:

Thank you for your letter inviting the Butte Free University to submit comments about the Forest Service environmental statement Herbicide Control of Big Sagebrush.

The conclusion reached on page 54, that the Free University is not completely opposed to the control of sagebrush with 2,4-D, is true, but members do have some concern about the proposed projects.

Members expressed a desire to see more study concerning the residue of 2,4-D in the food chain and a great deal of concern was expressed about thehalf-life of the chemical.

Members further desire extremely close supervision on project sites to see that absolutely no 2,4-D is sprayed into water and that studies be conducted to determine how much of the chemical is carried to water sources by runoff.

Members further question whether one year is enough time to allow the sprayed areas to remain idle after having been sprayed. Several members said at least three years is needed for the new grass to grow and for the land to readjust to the absence of sagebrush before grazing is allowed.

Members also feel closer study is needed before an area is designated as a project area to determine if the land in question is a sage grouse strutting ground or nesting area.

A count of sage grouse populations before and after an area is sprayed is also desired by Free University members.

Since your report states that the effect on summer food, cover and toxicity on amphibians and reptiles in the sprayed areas is unknown, members believe further study is desired to determine these effects before an area is sprayed.

Members believe all unknown effects of 2,4-D should be determined in a particular area before the next area

is sprayed.

So far the Forest Service has been helpful and seems to be willing to seek citizen participation about the spraying projects, we appreciate this.

We also realize more land must become productive to feed the human population.

Therefore we conclude that the extremely careful use, with continued study, of 2,4-D is satisfactory now.

But we feel the Forest Service should make every effort to find another, less dangerous, method of sagebrush control.

Sincerely,

Rich Foote

Butte Free University Members

Lewis Zundel

D. Mark Ciabattari

John R. Cater

Nancy Foote

Fred Rowe

Kim Bawden

Rose Mary Carollo

Albert Dirkse

Jane Ciabattari

Jane Zundel

THE DOW CHEMICAL COMPANY

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HF	✓
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March 24, 1972

Mr. Steven Yurich
Regional Forester
U.S. Forest Service
Region 1
Federal Building
Missoula, Montana 59801

Dear Mr. Yurich:

You were kind enough to send a draft of the Environmental Statement for your sagebrush control to me for comments. After reviewing this program, it seems to me that the details have been covered very thoroughly and adequately. I could find no suggestions for change and the only comment I have is a commendation to the people who have prepared this statement. I was particularly interested in the treatment of the impact on animal and bird populations. This seems to require an excessive amount of work just to get a good sagebrush job done, but at least for awhile the inputs to evaluate the impact on the various aspects of the environment will be worthwhile. This report should serve as a model for the larger jobs in your forest and range management programs. If I can contribute further in any way, please let me know.

Yours very truly,

L. E. Warren
Ag-Organics Department
Research and Development

kim

cc: Bud

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
P. O. Box 970, Bozeman, Montana 59715

March 29, 1972

Mr. Steve Yurich
Regional Forester
USDA - Forest Service
Region 1
Missoula, Montana 59801

Dear Mr. Yurich:

We have reviewed the draft environmental statement for the Northern Region's program of brush control with 2,4-D which was sent to our office 2/25/72.

The report documented both adverse and favorable aspects of chemical sagebrush control with broad research support.

We support your statement and the general benefits to be derived from the planned action.

We appreciate the opportunity to review and comment on this proposed project.

Sincerely,

A. B. Linford

A. B. Linford
State Conservationist

cc: Bed

University of Montana
Missoula, Montana 59801
(406) 243-0211

March 30, 1972

Mr. Steve Yurich, Regional Forester
U.S. Department of Agriculture
Forest Service
Region 1
Missoula, Montana 59801

Dear Mr. Yurich:

Thank you for the copy of the Draft Environmental Statement on herbicidal control of sagebrush and for your request for comments.

To comment fully is impossible with the time at my disposal. However, I submit the following points for your consideration.

On page II of the statement the comment is made that long-term favorable effects on the soil and productivity of the land are expected. This is a highly debatable conclusion. For example, Johnson (1) reported that 14 years after spraying on grazed range, more sagebrush was present on the sprayed land than on unsprayed. The noted plant ecologist, R. F. Daubenmire also argues against this point of view (2). He emphasizes the following considerations: 1. the increase in grass may be due to a temporary green-manuring effect, 2. sagebrush protects grass on depleted range, 3. sagebrush is the major productive user of the environment when the shallower-rooted species are aestivating. 4. large insect infestations may result from depletion of bird populations dependent upon sagebrush, 5. desirable forbs are also sensitive to 2,4D and, 6. sagebrush promotes the uniform accumulation of snow and delays its melting, both desirable qualities.

It is almost most unfortunate that the iso-octyl formulation of 2,4D is being used (p. 2). This was shown in the Bionetics study to cause birth defects in the offspring of female mice fed this compound (3). Also, although no data are available for pure 2,4D, it is known that similar polychlorophenols will produce the highly toxic and teratogenic compound dioxin, upon being burned. (4) Natural or artificial fires are not uncommon in sagebrush rangelands.

On p. 15, some evidence is offered for the rapid breakdown of 2,4D in the biosphere. However, this is chiefly true under warm, moist conditions, and much longer survival times can be expected under cooler or drier conditions. Since apparently no regular monitoring is being done in the Beaverhead operation, it would be premature to conclude that rapid degradation occurs there. Also, there is little hard data for the belief that 2,4D is detoxified in plants and animals (p. 27). In fact, it has been shown that 2,4D is much more difficult

to detoxify in plants than its naturally-occurring auxin counterpart, indole-acetic acid, a finding which is undoubtedly related to the herbicidal effectiveness of 2,4D (5).

Briefly mentioned in the statement (p. 45) is the inefficacy of biological control of sagebrush. However, in the vicinity of the Beaverhead operation, one can see examples of a kind of biological control due apparently to large-scale rodent action resulting in sagebrush kill. Surely, much more effort could be devoted to this phenomenon and to other possible kinds of biological control agents than is the case at present.

The statement is quite frank in indicating how many unknowns exist with respect to the effects of herbicide treatment (pp. 20, 21, 27, 28, and 38).

In view of the above, surely far more research data should have been available prior to embarking on such a massive chemical intervention into the environment. Since there is a long-term study underway at Winnett, Montana, sponsored by the BLM and Montana Fish and Game Department, assessing the total ecological impact of 2,4D spraying of sagebrush rangeland, why couldn't the Beaverhead Project be postponed until that study has been completed?

In the final analysis, it appears that short-term increases in livestock forage and the profitability of the herbicide control program to chemical manufacturers are taking precedence over wildlife and long-term environmental protection. Either a rest-rotation scheme should be employed, possibly on an 8-year cycle, or, if active sagebrush control must be continued, potentially less harmful, non-chemical approaches, such as over-surface mechanical removal should be attempted. Although perhaps somewhat costlier in the short-run, these could prove much more beneficial to the environment in the long-run.

Sincerely,

M. Chessin

Meyer Chessin, Professor
Department of Botany

MC:ln

cc: Bud

BIBLIOGRAPHY

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2. Daubenmire, R. F. 1970. The Steppe Vegetation of Washington. Wash. Agr. Exp. Sta. Tech. Bull. 62.

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Richard L. Timken, Ph.D.
Department of Biology
Western Montana College
Dillon, Montana 59725

March 31, 1972

Mr. Steve Yurich
Regional Forester
United States Department of Agriculture
Forest Service - Region 1
Missoula, Montana 59801

Dear Mr. Yurich:

I reviewed the copy of the draft concerning herbicide control of sage brush and offer the following criticisms, and suggestions.

I find the report contains numerous discrepancies in the titles of officials, institution names, etc. For example, there is no Donald M. Smith on the staff of Western Montana College. There is a Howard Smith. Western Montana College is the proper name for the college rather than Western Montana College of Education. Still another example is the name Dr. Ken Vandelier which should read Dr. Ken Bandelier. In the interest of consistency, if you are using the prefix "Dr." it should be used for all those so entitled. I am an assistant professor of biology not a full professor.

As far as the text goes, there are many generalities mentioned and some inaccurate statements presented. For example, there is a statement on page 5, item 6 that there will be no spraying within one hundred feet of hardwood or brush habitats. However, numerous drift areas and dead quaking aspen can be found in the Beaverhead National Forest. Several kills can be observed near Elk Lake.

I also find it hard to justify projects on the basis of added income to employees and to the local economy as stated on page 6. One should keep in mind, of course, these employees wages are paid by tax dollars.

Another example of generalization can be found on page 31. Having talked with local Forest Service employees, I question whether they know all the critical wildlife habitat areas for the various species of wildlife considered.

Finally, my major criticism of the draft concerns the arbitrary method of deciding who is in favor and who is against the use of 2,4-D. No one in the Forest Service questioned me regarding

exactly what my position was in the sage brush control issue. I have expressed criticism whenever I felt there was damage to the local ecosystem and/or potential damage to the populations of wildlife. I think it is definitely unprofessional to make statements concerning the opinions of others without first consulting them and requesting permission.

Sincerely,

Richard L. Timken

Richard L. Timken, Ph.D.
Assistant Professor of Biology

cc: Mr. C. R. Hartgraves, Supervisor
Beaverhead National Forest

Dr. James Short, President
Western Montana College

cc: Beaverhead

SRM SOCIETY FOR RANGE MANAGEMENT

INTERNATIONAL MOUNTAIN SECTION

MCG	
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U.S. RECEIVED APR-5 1972 RANGE & WILDLIFE MANAGEMENT

REGIONAL FORESTER

1940(2200)

April 3, 1972

Mr. Steve Yurich, Regional Forester
United States Forest Service
Missoula, Montana 59801

Dear Steve:

This refers to your letter of February 25 requesting a review of an enclosed draft of the environmental statement for the Northern Region's program of sagebrush control using 2,4-D herbicide.

I have reviewed the draft and found it comprehensive and informative. It clearly shows a professional approach to the activity of herbicidal spraying.

I have few comments that may be considered in the final draft. Under the section on "History of the Program", it would be informative to provide more detailed information regarding the results of past spray projects. In particular would be the extent to which sagebrush re-invasion of sprayed areas has taken place and whether re-invasion was correlated with site, climate, aspect or other factors.

The section on biological control could be strengthened in view of current information regarding an insect defoliator (Aroga websteri). Sagebrush mortality resulting from infestations of this insect has been reported for years particularly in Nevada. It would seem that a greater effort in research should be made to evaluate possibilities of biological control of sagebrush.

Another comment is what I have heard from stockmen and I will pass it along for what it is worth. Although spraying sagebrush on the Beaverhead N.F. has significantly increased pounds per acre of forage, there may be just as great or even greater benefits to be obtained from other national forests in Region One by providing more money to finance other types of range improvements, such as fence construction, reconstruction and water developments to establish pasture systems for intensive management.

What apparently is being questioned is the priority of needs to continue sagebrush eradication at a high level on a single forest after 16 years of continuous projects. To many stockmen this appears to be a one-sided program that favors a relatively few large ranch operations in a single area.

Thank you for the opportunity to review this report.

Yours sincerely,

Geoffrey E. Greene

GEOFFREY E. GREENE
President

cc: Bud

Gallatin Sportsmen's Association

"Protector of Woods, Water and Wild Life"
Bozeman, Montana 59715
703 West Mendenhall
March 30, 1972

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Steve Yurich, Regional Forester
USDA Forest Service Region 1
Missoula, MT 59801

Dear Mr. Yurich:

SUBJECT: USDA Draft Environmental Statement on Herbicide Control of Sagebrush 1940 (2200) 2/25/1972

We appreciate the opportunity to submit comments for your Draft Environmental Statement on Herbicide Control of Sagebrush. Our association is often concerned about government action programs on public lands and has found it difficult to review and comment effectively on the plans and philosophy relating to the programs.

Your cover letter February 25, 1972 from the Regional office indicates the enclosed draft is for the Northern Region's program of sagebrush control with herbicide. However, the draft appears to be limited to the Beaverhead National Forest, and we are not sure what this means. Is the regions program limited to Beaverhead National Forest? If not, we would prefer to review the regions entire long term sagebrush control program in one draft, not individual segments as this draft appears to represent.

Our impression of the report is that it is largely a project justification document for sagebrush control with a herbicide rather than an environmental impact analysis. The adverse effects of the program on all vegetation and animals, except grass and domestic livestock, is minimized. This is particularly disturbing in a statement prepared by a government agency that regularly affirms a multiple use and multi-disciplinary approach to management of our public lands.

We suggest a more detailed study of economic and social impacts be made. The statement concerning wildlife and recreation seem more matters of opinion than fact. Gene Quenemoen, a member of our Natural Resources Committee reviewed the economic analysis. His comments follow in their entirety:

> First of all I question the adequacy of the cost-return data. Although I have no quarrel with the method used in the report of computing the benefit-cost ratios, I think it is based on incomplete information. The value of additional animal unit months of grazing is considered without taking into account the value

of wildlife and other values which may be reduced as a result of spraying. I would also question using a 5 percent discount factor when the going rate of interest is 7 to 8 percent. A 7 percent discount factor would yield a 3.42 benefit-cost ratio rather than the 4.33 ratio indicated in the report.

My most serious reservation, however, concerns the implicit assumptions upon which the analysis is made. These assumptions take as given our national policies regarding the production and supply of meat for American consumers. To be more specific, the market value per animal unit month (AUM) of forage would be less than that used in the analysis if our national policies permitted free imports of meat and if they permitted free use of resources now being idled through agricultural programs.

At the present time there are approximately 50 million acres of crop land which have been idled through various government land retirement programs. If these acres were released for the production of meat, the price to the American consumer would be less and the economics of sagebrush spraying would look less favorable. If this sounds implausible reflect on the fact that the market value of an AUM of forage is directly related to the price of meat.

At the present time meat imports into the U. S. are limited to 1,240 million pounds per year. Relaxation of this control measure would, as in the case of land retirement policies, lower meat prices and reduce the economic incentive for sagebrush control.

It is my judgment that the economic feasibility of the project would be questionable if it were considered in the broader context outlined above. Furthermore, it is my impression the report is strongly biased in favor of sagebrush spraying even in the face of questionable effects on the environment. Certainly the public should be in no hurry to make investments in these lands, recognizing the weaknesses of the economic analysis, if there is any reasonable doubt about the net effect of the environmental impact.

Scientific documentation for the ecological consequences of sagebrush control is not adequately presented. We suspect that more information is available than is in this draft statement. In fact, some of the basic concepts presented in college undergraduate level botany, ecology, range management, zoology courses appears to be lacking. We suggest this statement be critiqued by people with substantial background and knowledge of ecology in sagebrush-grassland communities.

We are concerned about your statements regarding the favorable effects for wildlife populations in sagebrush control areas. Depending upon the species, we suspect there would be numerous and varied adverse reactions to the control program. Your implications that effected species would temporarily move to adjacent areas only demonstrates you have not adequately considered the already documented information on population dynamics and ecology of natural populations. Suppose long term inept range management of the sagebrush-grassland in Beaverhead National Forest had resulted in a predominant grass cover and we were advocating grass control, thereby making it more desirable for one of our favorite species. Then what would be your reaction? Would you be concerned if the situation were reversed?

The fact that you attribute the sagebrush dominace to livestock overgrazing (page 3 & 4) suggests a certain amount of negligence in past and present USFS range management programs, and in the future you plan to compensate for this by sagebrush control with herbicide. Apparently, in addition to sagebrush control, you are practicing alternative number 6, which is appropriately titled the "Do Nothing" alternative and says this is your "present season-long grazing system". We feel the practice of proper range management is implicit in your mandate to manage public lands for the public good, but control of sagebrush with herbicide is not necessarily a mark of progress in range management. In keeping with your mandate we recommend: (1) The immediate implementation of alternative 7 "Intensive Range Management Alone", and (2)-your plans for sagebrush control with herbicide be discarded.

Sincerely,

Everett A. Keyes

Everett A. Keyes, Vice President

Perry H. Nelson

Perry H. Nelson, Chairman
Natural Resources Committee

dw

cc. Bud

STATE OF MONTANA

DEPARTMENT OF
FISH AND GAME
Helena, Montana 59601
April 4, 1972

Mr. Steve Yurich, Regional Forester
Northern Region, U. S. Forest Service
2705 Spurgin Road
Missoula, Montana 59801

Dear Mr. Yurich:

We have appreciated the opportunity to review the Draft Environmental Statement regarding Herbicide Control of Big Sagebrush. This has provided an excellent means of expressing our concern for the overall environmental implications of the chemical sagebrush control program. Sagebrush areas provide important and extensive wildlife habitat in much of Montana.

In submitting our critique of the Forest Service Environmental Statement on Herbicide Control of Sagebrush, our comments and discussion will deal with the general content of the Statement, some of the philosophy relating to early brush control projects and with the specific projects listed under Appendix I. A page-by-page critique is attached.

It is disturbing to review an environmental impact statement prepared by an agency that has been charged with multiple-use consideration in land management and find the general direction of the statement to be extremely biased toward one end -- that of improving forage for domestic livestock on the National Forest. Neither the second or third reasons listed in the purpose statement justifying sagebrush control (improving ground cover and erosion prevention) are substantially verified in the text of the statement. The quality of the statement is particularly deficient in its consideration of impacts of sagebrush control on wildlife. In many instances information presented is erroneous and incomplete for which verification will be provided in our critique. The harmful impacts are minimized and the impression conveyed that sagebrush control will have beneficial effects on wildlife populations. In instances where it is apparent that adverse impacts could occur, the problem is dispatched by prophesying that the wildlife species can make out elsewhere or suggesting that the problem will only last a few years.

In retrospect, the earliest sagebrush control projects on the Beaverhead Forest in the mid-fifties provided little opportunity to inject quality wildlife habitat considerations into project operations. Methods of chemical application were more gross and opportunities to contact non-target vegetation with spray were more prevalent. Some of the early operations encompassed willow bottoms, aspen

groves and other vegetation important to wildlife. There were no preliminary studies conducted to determine the impacts of brush control on non-target organisms. There were numerous "motherhood" statements floating about as to the wonders of the accomplishments but little quantitative data were available to competently evaluate spray results. Some of the inital consideration given wildlife on spray projects resulted from hostile opposition to the projects by the Montana Fish and Game Department.

As sagebrush control work continued in to the sixties, more effort was made to evaluate the impacts on wildlife. Fish and Game Department people had an opportunity to review project proposals and submit recommendations to the Forest Service as to how projects could be altered to minimize impacts on wildlife. Many of these recommendations had to be general in nature because of the size and number of on-going projects and because detailed information on many areas was not available. In most all instances, the recommendations represented minimum considerations for wildlife -- areas known to be critical to the particular animals' survival. Big game winter ranges, grouse breeding grounds and known calving areas were examples of areas where buffer or leave areas were incorporated into projects. In most instances, obtaining concessions for less specific habitat requirements (summer range for various species) were difficult or impossible to obtain.

The primary purpose in this background discussion is to establish the point that direction provided by this Department to delete critical or important wildlife habitat from the spray projects was not in any way an endorsement of the control practice. Most oral and written communications from our Department made note of this point. There were instances when the minimum recommendations were interpreted by the land management agency as an endorsement of the control practice.

The enactment of the Environmental Policy Act and the resultant requirement to provide impact statements with sagebrush control projects offers the first real opportunity to satisfactorily assess the overall effects of the control action. It also provides an opportunity to re-evaluate some of the past efforts to afford protection to some of the non-target organisms. Specifically, it puts any proposal in a new light and in some situations could completely negate previous efforts that were sincerely, although inadequately, aimed at protection of non-target organisms. Consequently, if we offer statements relating to a particular spray project or to spray projects generally that may be more stringent than previous recommendations, they should not be interpreted as contrary to the previous efforts.

The current statement lists this Department in the number one slot of groups or organizations opposed to sagebrush control with 2,4-D. We readily acknowledge the correctness of that statement today. The overall lack of credibility of this Environmental Statement can only fortify our opposition.

We do support intensive range management alternatives that are capable of improving vegetation and soil conditions and that sincerely consider all public benefits.

Sincerely,

Don L. Brown

DON L. BROWN, DIRECTOR
MONTANA FISH AND GAME DEPARTMENT

DLB/b
Encl
cc - Russell E. Train
T. C. Byerly
John Green
Edwin Zaidlicz
Mike Mansfield
Lee Metcalf
Frank Church
Eldon Smith
Ted Schwinden
Fletcher Newby
Don Aldrich

PAGE-BY-PAGE COMMENTS REGARDING ENVIRONMENTAL STATEMENT ON HERBICIDE CONTROL OF BIG SAGEBRUSH

Page i. III. BRIEF DESCRIPTION OF ACTION

The purpose given for action "is to increase forage production for domestic livestock and *to restore and improve the vegetative ground cover to prevent erosion.*" We feel that the "soil erosion" reason stated in purpose is an irresponsible, misleading assumption for which an adequate basis is not provided in this document. Conspicuous by their absence, are statements regarding the influence of livestock (or other animals) on soil erosion and vegetation impairment. Overgrazing by livestock is given as the cause of the "problem" (page 3).

Page ii. IV. SUMMARY OF ENVIRONMENTAL IMPACTS AND ADVERSE ENVIRONMENTAL EFFECTS

It is stated that, "*This alteration of the vegetative community will have both favorable and adverse effects on the wildlife inhabiting the project areas.*" This document does a very poor job of providing supporting details for this statement. Pertinent wildlife literature is not only available but has been directly supplied to the agency responsible for the report.

Another sentence on page ii appears to lack adequate basis considering what is provided in the overall document. That statement is, "*It will have long-term favorable effects on the soil and productivity of the land.*" Based on the current literature we cannot see justification for such a "blanket" statement. Despite 16 years of sagebrush control cited for the Beaverhead Forest, we did not find specific evidence in this document to indicate that favorable effects on the soil have been measured. Productivity of public land should include values besides livestock forage.

V. ALTERNATIVES CONSIDERED (also pages 39-48)

The alternatives range from a total kill of sagebrush to "do nothing." There appear to be some tragic voids in these alternatives. If a decision for "action" is deemed necessary and if a sincere concern for the environment exists -- then why is so little emphasis placed on treating the cause for the problem, which has been acknowledged to be *overgrazing by domestic livestock?* The benefits to soil and vegetation by spring grazing deferments, reduced stocking, or some combinations thereof, apparently are not seriously considered as alternatives prior to or instead of spraying.

Forest Service officials from the Regional Office and the Beaverhead have jointly viewed Fish and Game-Bureau of Land Management sagebrush studies at Winnett that evaluate environmental impacts of total kill, partial kill, and strip spraying methods. A major point conceded by this group after the field tour was that spraying sagebrush in narrow strips obviously provided less disruption to associated fauna than total kill spraying in larger blocks. Strip spraying is not mentioned in this document as an alternative.

Literature citations have been abused in the following sentence from page 3: "*Historical records and other studies of this area have shown that many of these stands now dominated with 25 or more percent crown cover of sagebrush were originally dominated by grass with only scattered sagebrush.*" (References 1, 2, 3, 4)

Reference 1 (Morris and Pace 1958:8) agreed with reports of early travelers, "that sagebrush was not present or was subordinate to the grasses in characterizing the landscape at various locations in western Montana." They stated (page 7) that, "grazing is the major factor associated with sagebrush dominance over much of the area where it occurs." As used, this reference appears to be out of context.

Reference 2 (Peek 1963) merely described a sagebrush-grassland community which he separated into three vegetative types including varying amounts of sagebrush. Peek does not present data on sagebrush but cites Wright and Wright (1948) and Evanko and Peterson (1955) in saying that sagebrush represents a grazing disclimax.

Reference 4 (Evanko and Peterson 1955) is pointless as they only cite Wright and Wright (Reference 3) and present no data on sagebrush.

Reference 3 (Wright and Wright 1948) is a study of protected (cemeteries) and grazed vegetation. One cemetery is located near Virginia City; sagebrush was not reported to be either in that cemetery or in adjacent pastures. Other cemeteries described are located at points east, from Three Forks to Hardin. Statements are made that *Artemisia tridentata* has increased in parts of south-central Montana -- but Reference 3 also does not provide a basis for the type of statement used in this document.

Page 3 -- Paragraph 1

It is stated that "*Sagebrush has increased on these stands due primarily to too much livestock use ... there has been a decrease in total plant cover which has led to increased soil erosion.*" Nothing is said about correcting the cause of soil erosion. Is it implied that sagebrush is causing the deterioration in the plant community?

Page 3 -- Paragraph 3

The short- and long-term effects of spray projects on wildlife are conflicting and confusing. It is stated, "*The effects of the program on vegetation are expected to last for a period of 5 to 20 years. Most of the effects on associated species are expected to be of shorter duration.*"

This is absolute speculation and not founded on observation or supported by the literature. Organisms are related or dependent on existing habitat and animal populations will change with changes in vegetation. This concept is ordinarily presented in elementary science courses.

"... *the description of environmental effects of this program are based on 16 years of experience in controlling sagebrush with 2,4-D on the Beaverhead program area* ..." It is implied that 16 years' experience spraying sagebrush enhances their position to describe environmental effects of their actions. This is not necessarily axiomatic if the goal has been singly aimed at one purpose, to kill sagebrush. It is interesting to note that contracted studies (MSU Ag. Expt. Sta.) were only recently (1970) begun to determine: 1) the effects of chemical sagebrush eradication on associated forb vegetation; 2) the long-term effects of spraying on sagebrush populations.

Page 4. PURPOSE

Three purposes are given for controlling sagebrush. They subsequently provide documentation for purpose 1) to increase production of forage for use by domestic livestock. However, this document does not provide validity for purpose 2) *to restore plant cover and prevent erosion* or 3) *to restore balance of plant species to more nearly that which occurred before overgrazing.*

Page 4. OTHER DEMANDS

The absence of any other demands listed for public rangeland other than repeating "more livestock range -- rural economy -- local chambers of commerce, etc." does not seem appropriate from the standpoint of multiple-use on a National Forest.

Page 5. PLANNED MEASURES TO MINIMIZE ENVIRONMENTAL IMPACTS

The measures listed in this document are not as protective to non-target organisms as those listed in either of the Forest Service statements[1] presented at the Interagency Meeting on the Control of Big Sagebrush, MSU, Bozeman, March 23, 1966. For example, 1966 statements include 300 feet (minimum) protective strips along streams and strip-spray patterns in sage grouse summer habitat to lessen the environmental impact. This 1972-73 document has stream protection strips of 100 feet (minimum) and never mentions strip-spraying. This particular point is an example of many inconsistencies in this document that lessen its credibility as an Environmental Impact Statement that sincerely considers overall resources and values on public land.

Page 6. ECONOMIC AND SOCIAL IMPACTS

No basis has been given for the statement, "*There will be no significant change in the amount or type of human recreational use of the project areas.*" Considering the food and cover values being removed for various types of wildlife, future recreational potentials should be considered.

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[1]"Region One Policy for Herbicide Spraying" by George Engler and "Habitat Preservation-Sage Grouse and Sagebrush Control" (including the Resolution passed by the Western Association of State Game and Fish Commissioners for Preservation of Sagebrush Habitat) by Dr. L. Jack Lyon.

The increase in annual grass production is stated and then they *"assume 50 percent of this increase will be left for watershed protection and benefits to soil and wildlife"* after the livestock use. This statement is not positive to start with and secondly, it disregards the important fact that the increase in vegetation is primarily grass, the forage class in the least demand from the wildlife viewpoint.

Page 9. Benefit-Cost Ratio

The validity of the economic analysis depends primarily upon the "20-year period of effectiveness" which has been derived from Reference No. 5 (Krenz 1962). This author (Krenz) qualified his study (page 12) by saying that, "An exact determination of the economic returns from spraying would be possible only through actual grazing studies on sprayed and unsprayed areas over a period of at least 10 to 15 years." (All data he subsequently presented were collected during a 6-year period -- and relied heavily on rancher estimates.)

Examination of Krenz (1962) shows that the 20-year estimate is based upon speculation. On page 18 (referring to areas with 14-20 inches of annual precipitation) he states, "The reader should remember that the above rates of return are based on an assumed life of the spraying operation of 13 years. As mentioned, this particular period is the average estimate made by ranchers. Many plant scientists feel that a good kill should give lasting control for 20 or more years."

On page 21, Krenz (referring to areas with 20 or more inches of annual precipitation) states, "Although exact data on yields since 1957 were not obtained, continued high levels of forage yields up to 1960 have led range management specialists to estimate that sprayed range in the Big Horn area will be more productive than unsprayed ranges for at least 20 years after spraying, and maybe longer. This prediction is based on the fact that most of the mature sagebrush plants at time of spraying were 40 or more years old. Where a good kill has been obtained on mature sagebrush plants, 40 to 50 years may be required before the sagebrush stand is as competitive for moisture and plant nutrients, as it was before spraying. Hence, in the evaluation of forage on Big Horn Mountain plots, 20 years will be used as the expected life of the spraying operation."

Precipitation data are not given for the specific Beaverhead spray areas; 12-30 inches annually is listed for the program area. The reference by Krenz (1962) and another[1], not cited, indicate the life expectancy of sagebrush control (in drier sites) is far less than 20 years! Field observations by our personnel of spray projects in the Gravelly Mountains substantiate the preceding two references.

Confusion exists in the use of Reference 5 (Krenz 1962) who is cited earlier (page 3): "The effects of the program on the vegetation are expected to last for a period of from *5 to 20 years.*"

[1]Johnson, W. M. 1969. Life expectancy of a sagebrush control in central Wyoming. J. Range Mgmt. 22(3):177-182.

Are not these public lands still going to be "overgrazed" if the stocking rate is based on the "inflated" livestock grazing capacity adjusted after sagebrush spraying and deferment?

Page 14. SOIL

They expect "approximately 6 ppm of 2,4-D to be deposited in the surface inch of soil" based on Reference 13) Norris (1971), which refers to forested areas in Oregon. We question the validity of this reference as used. Norris is again quoted (page 15) to say that, " ... about 100 to 300 ppm of actual 2,4-D are expected to be deposited on or absorbed by the ground vegetation."

Page 15 -- Paragraph 2

In regard to the last sentence, several spray projects in the 5-year plan are re-sprays. (Doolittle and Elk Point), so apparently plans to minimize re-establishment of sagebrush is being considered in some instances.

Page 16 -- Table 1

This table omits a number of plants very important to wildlife, *Taraxacum officinale*, *Tragopogon dubius* and *Artemisia frigida*, for example.

Page 19. SOUNDS AND SMELLS

Sixteen years of spraying experience should be sufficient to know that smell of diesel fuel lasts longer than a "few days."

Pages 20-21. ANIMALS

The lack of credibility of this and supporting segments such as Table 2 (giving plus and minus values to the possible impacts to various wildlife species) is probably one of the greatest offenses made to the title and objectivity of this document.

Pages 23-24. SOIL

Five reasons are given why "*converting vegetative cover to grass from sagebrush*" will be favorable to the soil. Based on supporting evidence in this document, these statements are almost entirely conjecture. From what knowledge we have as to the literature on this, we doubt that these statements could be defended by responsible scientists.

It is stated: "*There will be a long-term, favorable effect on herbaceous vegetation from this program. The removal of sagebrush makes more water, nutrients, and space available for other plants.*"

These statements lack credence. The composition of forbs is directly changed by the chemical for indefinite periods. There is evidence[1] elsewhere that much of the water and nutrients used by sagebrush are so deep as to be largely unavailable to other plants.

Page 24 -- Paragraph 1

Have studies been conducted on spray areas, before and after treatment, to determine the actual benefits derived from brush control in terms of water quality or are these simply assumptions?

Page 24 -- Visual Appearances

Reference is made to brush control projects providing a mosaic of sagebrush and grasslands as a favorable effect. For the most part, this condition exists on many of the projects before spray -- the cultural practice tends to resemble a farming operation with sharp demarcation between controlled and uncontrolled sites. At least it was pointed out that this was an opinion.

Page 25. ANIMALS

It is stated: " ... *the increase in grass, caused by the program, will result in an increase in livestock grazing capacity of the areas.*"

This and other statements in this document seem to say that overgrazing will be continued with the emphasis on immediate economic gain. We fail to see how this will benefit wildlife.

We do not agree that blocks of sprayed sagebrush will necessarily "*increase the degree of interspersion of vegetation types*" with "*a long-term favorable effect on wildlife ...*" There is little description of vegetation characteristics of target areas given in this document except on page 27, they state that: " ... *the spray areas chosen have a good understory of herbaceous vegetation ...*" If project design initially considered wildlife needs it *might be possible* to improve or provide useful edge.

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[1]Daubenmire, R. 1970. Steppe Vegetation of Washington. Tech. Bull. 62. Washington Ag. Expt. Sta. 131 pp.

The statement that blue grouse are "*primarily seed eaters*" and the implication that they will "*benefit with increased summer food and grass cover*" is another of numerous irresponsible statements in this document. Reference to any of the literature[1] on this bird would have shown the great variety of plant and animal foods taken by blue grouse during the summer months. Seeds are only part of plant material eaten by blue grouse and are likely to be from plants that would be decreased by 2,4-D. Beer (1943:35) states that: "Grass blades and a few seeds are consumed in a limited degree, comprising but a trace in the diet." Mussehl (1963)[2] indicated the importance of herbaceous cover that included interspersed mixtures of grasses and forbs in proximity to brush or tree cover. Low shrubs served in a secondary position to bunch grasses and forbs. He made over 700 observations of blue grouse broods in three areas of Montana and stated (page 550): "Homogeneous stands of grass were apparently little used."

Page 31. ANIMALS

Specific project areas have been reviewed and attempts have been made to identify "critical wildlife habitat." As discussed in the introductory statements, those areas represent minimum habitat considerations on known winter ranges, speculated calving areas or grouse breeding grounds that have been identified.

This leaves substantial area that has value as habitat, however, the acuteness or specificness has not been established. Parts of Project 631 are still in limbo regarding agreement as to necessary buffers.

Recently, the Beaverhead Forest has provided direction to their personnel that the parts of the Deadman Project 631, on which conflict exists, not be sprayed until such time as the conflicts are satisfactorily resolved by that agency and the Fish and Game Department.

Page 35 -- Paragraph 2

Brewer's Sparrow

They have referred to some of the pertinent literature for effects of Brewer's sparrows and sage grouse. However, the statement, "*There will be no effect on the sparrows living in adjacent unsprayed sagebrush stands*," can only be an opinion; it is not part of this literature.

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[1]Beer, J. 1943. Food habits of the blue grouse. J. Wildl. Mgmt. 7(1):32-44.
Stewart, R. E. 1944. Food habits of blue grouse. The Condor. (46):112-120.
Mussehl, T. W. and R. B. Finley. 1967. Residues of DDT in forest grouse following spruce budworm spraying. J. Wildl. Mgmt. 31(2):270-287.

[2]Mussehl, T. W. 1963. Blue grouse brood cover selection and land-use implications. J. Wildl. Mgmt. 27(4):546-555.

Summer range for sage grouse occurs in Project Areas 717, 617, 687, and 671. Specific data are not available for Projects 679, 688 and 698. The general content of this paragraph suggests that sage grouse can move back and forth with changes in vegetation. Again these things are suppositions and should be clearly stated as such. There are indications that sagebrush removal has had adverse effects on grouse populations on certain projects. A strutting ground in the Mud Lake vicinity in the Big Hole showed a substantial reduction in breeding males (150-30) following sagebrush control.

Page 36. Elk

The specific influence that sagebrush control will have on elk summer forage and calving activity cannot be completely predicted for the respective projects. The leave areas recommended for calving are based on the knowledge that some sagebrush is desirable as cover. The sagebrush is desirable for a number of reasons, one being that it is not chewed to ground level by grazing animals. When pastures receive heavy use at given times, most herbaceous vegetation can be removed to the extent it would not afford adequate cover. As previously discussed, the buffers are minimums.

Page 37 -- Paragraph 1

"*Favorable effect of increased grass on these projects should outweigh the possible adverse effect.*" Our Department has never requested sagebrush control to improve elk ranges -- we are not aware of situations where brush control in itself has improved conditions for elk.

Deer

These general statements don't give consideration to behavioral patterns of animals -- maybe deer can find substitute areas for life processes on adjacent areas -- maybe they can't. The fact that deer have been observed using grassland types in sprayed areas does not in any way preclude the importance of sagebrush.

Page 38. Moose

Moose are known to make use of sagebrush vegetation as calving sites -- influences that brush control will have in these situations are not known.

It is implied in this segment (pp. 31-38) that habitat destruction only results in a simple displacement of animals to other areas. No consideration is given to animal behavior (especially territoriality) or existing populations or security levels in these other areas. No information is provided in this document as to the proximity of the proposed target areas to the 234,000 acres on which sagebrush has already been controlled.

In our opinion, alternatives 1 (burning) and 7 (intensive range management) provide the only potential choices at the present time. It is difficult to evaluate burning since its application has been so restricted. Observations of known burns indicate that fire can remove sagebrush for significantly long periods of time. Prior to accepting burning as an operational management tool, it is essential that effects of existing burns be better understood.

The comments listed under the Adverse column, under Alternative 7, pages 46-47, appear to be over-stated.

"*No assured removal of heavy sagebrush cover from ecosystem.*" This statement is contrary to established principles of plant succession -- if there are no ultimate reductions in sagebrush density with the proposed management systems it might be necessary to conclude that dense sagebrush stands are climax or that the management system is inadequate.

"*Sagebrush robs more productive forage plants of moisture and nutrients.*" This is correct only in the sense that "grass" is considered to be a more desirable plant than sagebrush and forbs. The benefits of nutrient cycling that can be attributed to deep-rooted plants is pointed out by Daubenmire.[1]

"*Continuous, heavy sagebrush not as pleasant as mosaic of grass and sage.*" This is an opinion as to what's more pleasing. Natural succession and dispersion of plant life tends to be equally as pleasing as the man-made configurations according to other opinions.

"*Economic impact on permittees and on local economy over a long-term period.*" Why should public land management be aimed at various crash programs affording short-term benefits to limited groups at the expense of some other resource values when the same benefits ultimately could be obtained through management over a longer time interval?

"*Long-term -- no development of wider variety of habitat types for animal life.*" Habitat types that can be maintained on a given land area will relate to climate, soils and animal influence. In our opinion, sagebrush control reduces variety on the areas to which it is applied.

VI. Relationship Between Short-term Uses of Man's Environment and the Maintenance of Long-term Productivity

Any of the effects stated under this heading that are considered desirable, can be obtained by well-planned and executed land management. The detrimental aspects associated with wildlife populations will be reduced by proper land management that deletes sagebrush control with 2,4-D.

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[1]Daubenmire, R. 1970. Steppe Vegetation of Washington. Tech. Bull. 62. Washington Ag. Expt. Sta. 131 pp.

VII. Irreversible and Irretrievable Commitment of Resources

It is difficult to assess this matter when a variety of matters are not understood, and some of the input utilized in the assessment is known to be incomplete and/or erroneous. The impact statement does not completely satisfy the conclusion that irreversible commitment of resources will not occur.

STATE OF
MONTANA

DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT

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April 7, 1972

Mr. Steve Yurich
Regional Forester
USDA, Forest Service
Region 1
Missoula, Montana 59801

Dear Mr. Yurich:

As the State's Clearinghouse Coordinator, I have been following comments generated by the Draft Environmental Impact Statement for the Northern Region's Program of Sagebrush Control with Herbicide 2,4-D. This Statement has generated more interest (and opposition) than almost any we have observed in one year spent reviewing Environmental Statements. We suggest that more than paperwork might be necessary if this concept of sagebrush control by chemicals is to be continued. It is our observation that public meetings generally accomplish more for really defensible, though controversial projects than any other form of communication. Granted, the task of doing ones homework is formidable--and the presentation can be difficult even unpleasant--but the opportunity to "clear the air" is most often worth the trouble.

Comments upon the Statement will focus upon the question of benefits of the project. We question whether it is made clear enough and presented in a sufficiently convincing fashion that benefits prevail so as to make criticism less of a problem than it obviously is.

Refer to Part 1, Par. D: The District Ranger has determined that this range improvement method is needed to meet the purposes stated in previous paragraphs, i.e. to increase forage for domestic livestock, to prevent corrosion and to restore a balance of plant species. The problem, we believe, starts at this point. What is the value of one District Ranger's judgment in this highly controversial issue, one may ask? This is akin to asking certain highway engineers their evaluation of wide ribbons of concrete through urban areas or wilderness regions of great beauty: they usually and quite predictably see their designs enhancing the utility and beauty of any area over which the concrete passes. See Par. E. How badly will the economy suffer if the sagebrush remains? Did County Commissioners and local Chamber of Commerce in fact ask for this specific project or offer documents in support of 2,4-D spray? Basic Policy of the U.S. Department of Agriculture is no more sacred than any other policy.

It can and should be constantly changing. What price rural area development? How many ranchers can specifically be identified who will benefit from this project, and what is their financial condition? What price expansion? These are the types of searching questions which probably should be asked--and answered--in a project as this one where feelings run high and middle ground is hard to identify.

I hope these few remarks are received as intended; i.e., as constructive additions to the many you have already received. It is my belief that the project may have merit, but that it must be clearly demonstrated and convincingly presented.

Sincerely yours,

Lloyd F. Meyer

Lloyd F. Meyer
A-95/EIS Coordinator

LFM/hh

AGRICULTURE — MISSOULA, MONTANA